The Role of Digital Commons in a Socio-Ecological Transition of Cities

Dissertation

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1 See Bitcoin Energy Index, , accessed on 23/04/2019.

Dedicating this work to my late father, Fred Labaeye.

Abstract

The commons paradigm has transformed the way we understand the governance of both tangible and intangible shared resources. At a time when cities are put in the focus of the sustainability debate, this doctoral research investigates how collective action through digital and urban commons can contribute to a socio-ecological transition of cities. It is a contribution to illuminate the role that citizen-driven initiatives can play at the intersection of the urban and digital spaces, in contrast with the dominant discourses (e.g. Sharing Economy, Smart Cities) that place market and technology at the foreground.

It addresses three lines of investigation. First, it explores how research about grassroots alternatives for sustainable and just cities may benefit from a particular type of digital commons: collaborative cartographic mappings. Second, it investigates the intertwin of digital commons with physical urban commons to understand how commoning may lead to transformative impacts in the city. Third, it seeks to evaluate the transformative potential of the commons as a narrative of change for sustainable and just cities in the digital age.

As the research unfolded it appeared necessary to switch from a focus on commons that tends to consider commons as given to investigating a *commoning* process: the reclaiming and creation of shared urban resources. Results further showed that commoning benefits from being conceived beyond the concept of resources. Indeed, the classical epistemological approach of the established Institutional Analysis and Development framework tends to naturalize what is a moving social practice. It thus creates artificial divides that lead to significant methodological obstacles: a single process or practice is divided between two resources, an immaterial one and a material other, obscuring the more essential relational practice of community building. Instead, urban commoning is best defined as a relational practice of caring for and building partnerships for the reproduction of life in the city. Another significant result is that, while they may open new potential, digital tools are not central to commoning the city, in contrast to the discourses of the Sharing Economy or Smart Cities. No conclusive evidence was found that commoning is (yet) transforming major urban sub-systems. However, as a grassroots innovation, potential for its replication is confirmed. Eventually I outlined a research opportunity for engaging grassroots-led collaborative mappings to co-produce knowledge about alternative urban economies. The process itself would benefit from being modelled as a commoning effort.

Several future research avenues are outlined. Epistemologically, I recommend aligning the effort of researching urban commoning to the Diverse/Community Economies research agenda and its more-than-human and post-capitalist understanding of a relational phenomenon. The performative study of more-than-human urban commoning-communities would add to positivist efforts of identifying grassroots innovations or transformative social innovation that seek to understand the role of civic innovation in sustainability transitions. Methodologically, thick description, a weak form of theory, and engaging through action research with tools such as collaborative mapping can contribute to let new (urban) facts emerging. Research on the institutionalization of commoning is also needed. A more radical research direction is proposed with thematizing the role of transformation of consciousness in the processes of urban transformation. Cities are a privileged terrain to performatively document commoning-

communities involving changes of consciousness among commoners. Eventually, concrete examples of practices and their communities are proposed: urban foraging, food fermentation, free Internet provision, open-source bread fabrication.

Keywords: Digital Commons; Urban Commons; Commoning, Sustainability Transitions; Community Economies; IAD framework; Smart City; Sharing Cities; Sharing Economy

Zusammenfassung

Diese Doktorarbeit untersucht die Rolle, die Bürgerinitiativen an der Schnittstelle zwischen städtischen und digitalen Räumen spielen können.

Sie folgt drei Untersuchungslinien. Zunächst wird untersucht, wie die Forschung zu aus Graswurzelbewegungen entstandenen Alternativen für nachhaltige und gerechte Städte von einer besonderen Art des digitalen Gemeinguts profitieren kann: des kollaborativen kartografischen Mappings. Zweitens wird die Verflechtung von digitalen Gemeingütern mit physischen städtischen Gemeingütern untersucht, um zu verstehen, wie die gemeinsame Nutzung zu transformativen Effekten in der Stadt führen kann. Drittens wird versucht, das transformative Potenzial der Gemeingüter als ein Narrativ des Wandels für nachhaltige und gerechte Städte im digitalen Zeitalter zu bewerten.

Methodisch stützt die Arbeit sich auf Aktionsforschung, primäre Einzelfallstudien sowie eine vergleichende Fallstudienanalyse.

Ein vorläufiges Ergebnis ist die Identifizierung von basisgeleiteten kollaborativen Mappings – hier betrachtet als Initiativen des gemeinsamen Wirkens (Commoning) – als wertvolle Wissensquellen zu alternativer Stadtökonomik.

Die Hauptergebnisse zwingen uns dazu, das klassisch-naturalistische Verständnis des Gemeinguts in Frage zu stellen, welches dazu neigt, ein Gemeingut als gegeben zu betrachten. Stattdessen wäre es für die Forschung von Vorteil, einen gemeinsamen Prozess zu untersuchen: die Rückgewinnung, Schaffung und Nutzung gemeinsamer städtischer Ressourcen. Über die künstliche Trennung zwischen materiellen und immateriellen Facetten des Gemeingutes hinaus lässt sich (urbanes) Commoning am besten als eine relationale Praxis in Pflege und Aufbau von Partnerschaften für die Reproduktion von Leben in der Stadt definieren. Dies ist umso wichtiger, als ein weiteres bedeutendes Ergebnis der vorliegenden Arbeit darin besteht, dass digitale Werkzeuge zwar neue Potenziale eröffnen können, aber im Gegensatz zu anderen Diskursen (Sharing Economy, Smart Cities) für das Commoning der Stadt nicht von zentraler Bedeutung sind.

Erkenntnistheoretisch empfiehlt der Autor, die Forschungsanstrengungen im Bereich des urbanen Commonings an der Forschungsagenda "Diverse/Community Economies" auszurichten, die performative Studien zu urbanen Commoning-Communities fordert, die über das rein menschliche Kollektiv hinausgehen (more-than-human urban commoning-communities).

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1 Introduction

Online collaboration has enabled the development of peer production and the emergence of digital commons (Benkler 2006; Fuster Morell 2014). Beyond the most notable examples of Wikipedia or OpenStreetMap, communities have mushroomed online around shared commons: from over 30 million Free/libre Open Source Software (FOSS) projects on Github to 1.4 billion creative works shared as Creative Commons (Creative Commons 2018), digital commons have moved from a niche position to the mainstream, profoundly transforming the IT and creative industries. And yet they remain a marginal economic phenomenon in the scientific literature, although the commons framework has already radically transformed our comprehension of natural resource governance. There is, however, growing evidence that conceiving digital commons offers transformative potential beyond the IT and creative worlds.

On the one hand, data is emerging as a key urban resource that some – not afraid of any contradiction – want to, at the same time, mine as "the new oil" (Deutscher 2013) and process algorithmically for optimizing urban systems to deliver sustainability and prosperity (IBM Global Services 2009). For better or worse big data and its smart city selling point is already impacting urban development (Morozov and Bria 2018). Aside from smart city giants and other GAFAs, local governments are also playing a central role as they digitize their information systems and update the governance of vast information resources that have suddenly became coveted by a globalized data industry. Third in line, powered by online collaboration technologies, peer production is also appearing in the side-lines as a disruptive trend in this new landscape. In Germany, the commoners of Freifunk have self-organized free Internet access, assembling the largest mesh network in the world, organized through over 440 local communities (Freifunk 2019). Across Europe, the Smart Citizen Kit community records real-time and independent urban environmental data unleashing collaboration between universities, citizens groups and city authorities (Smart Citizen 2019). Such digital commons are arguably also urban commons. Scores of such grassroots innovations, yet to identify, should be of interest to the study of sustainability transitions that is giving increasing attention to multi-scalar innovation processes and transition pathways (Seyfang and Smith 2007; Leach et al. 2012). Indeed, authors are starting to voice the idea that urban commons are central in socio-ecological transitions (Bauwens and Niaros 2017). The argument is that the commons framework enable us to rethink questions about how shared

resources are used and governed in the city, suggesting that collaborative and polycentric strategies that have proven their contribution to sustainability in the context of natural resources (Ostrom 1990) may be scaled to the city itself (Foster and Iaione 2015).

On the other hand, digital commons are also often knowledge commons. The open-access publishing movement, in particular, has shown that communities can successfully collectively organize to ensure sustainable and fair access to scholarly publications as commons, in response to their massive enclosure behind paywalls. Beyond librarian challenges, online commoning is reshaping the very way knowledge is produced (Hess and Ostrom 2007a). This is emblematically true for cartographic knowledge. Thus, OpenStreetMap, is a cartographic database produced by the crowd covering the whole planet and which status as a commons is guaranteed by an Open Data Commons Open Database License. Peer production is transforming the production of map knowledge, a process known as Volunteered Geographic Information (Goodchild 2007). More widely, online collaboration has enabled hundreds of citizen science projects where citizens have been involved in tasks ranging from data collection and analysis to complex problem solving (Nascimento et al. 2014). When conceiving citizen science in the 1990s Irwin thought it as “a science, which assists the needs and concerns of citizens (…) [implying at the same time] a form of science developed and enacted by citizens themselves” (Irwin 1995, p. ix): for him, it would play a key part in steering sustainable development. Two decades later, the (digital) commons framework may prove useful in addressing the questions of how knowledge resources for sustainability can be generated, used, and governed collaboratively.

1.1 Puzzle

The transformative potential of commons at the intersection of the digital and urban spaces to contribute to a sustainability transition and to its (scientific) study has barely been researched. This is particularly striking as the commons has obtained mainstream academic recognition as an alternative mode of governance that is able to deliver sustainable, efficient, and equitable outcomes (Ostrom 2009). Even more surprising that with the development of the Internet and its opportunities for increased collaboration, digital commons have become a phenomenon that is transforming our understanding of knowledge production and diffusion as well the process of innovation (Benkler 2006).

From this assessment, and through successive iterations, I elaborated the following research program:

(i) Research as a commons: investigating the practice of collaborative mapping I will explore avenues for research to bridge its efforts with grassroots digital commons to build a transformative knowledge commons for sustainability transitions.
(ii) Bring to light and unpack the intertwining of urban and digital commons: I intend to document and analyze cases depicting commons at the intersection of urban and digital spaces.
(iii) The commons as a narrative: I will investigate the commons paradigm as a transformative narrative of change for sustainable and just cities.

1.2 State of Research

As the starting point of this work, I review the literature about digital commons, reporting on existing ventures in extending the conceptual approach to the urban context. This brings the literature review to developments around the application of the commons framework to urban resources and the city itself: urban commons. In a final part, I provide a landscape of methodological approaches that have been used so far in the study of digital and urban commons and, more generally, of grassroots innovations and alternative economies.

1.2.1 The Digital Commons

“The ‘hyperchange’ of technologies and social networks”, affects every aspect of how knowledge, information and data are managed and governed (Hess and Ostrom 2007b, p. 9). As a result, knowledge – as an umbrella term for the tryptic of knowledge-information-data – is increasingly analysed and handled in practice as a commons. As immaterial resources, knowledge or digital commons are subject to social dilemmas of a different nature than that which is typical for material environments: escaping issues of rivalry, they are more subject to dilemmas such as degradation, enclosure, commodification (Hess and Ostrom 2007a), and lack of use due to excessive patent or copyright protections – a phenomenon known as the tragedy of the anti-commons (Heller and Eisenberg 1998). According to Hess and Ostrom (Hess and Ostrom 2007a), the academic study of these commons situated in the digital world emerges in the late 1990s from information scientists (Brin 1995; Gupta et al. 1997), legal scholars (Reese 1994; Benkler 1997; Hess and Ostrom 2003; Boyle 2003) as well as activists (Bollier and Watts 2002). On the practitioners side, the emergence of the Free

and Open Source Software (FOSS) movement in the 1980s is probably the most prominent example of how people struggling with issues of enclosure and commodification of shared knowledge – here software code – have designed a counter-strategy mainly based on the use of so-called copyleft licenses to safeguard a commons (Stallman 1999). Following Stallman, Lessig (2001) pointed in particular the risk of stifling creativity and innovation through abusive copyright policies and advocated instead for commons-oriented approaches. In 2001, he co-founded Creative Commons: an organization that offers a set of alternative copyright licenses that enable authors to allow sharing, remixing and reuse of their works while being credited for it. As of 2017, over 1.4 billion works have been released as Creative Commons (Creative Commons 2018) and the license is a key instrument to preserve all of Wikipedia content as a commons.

Digital or knowledge commons – we use the terms interchangeably although we are aware that the latter, broader, encompasses the former – such as Wikipedia or FOSS have often been studied through the use of institutionalist perspectives (IAD framework) borrowed to the seasoned study of environmental resources (Madison et al. 2010; Schweik and English 2013; Frischmann et al. 2014; Fuster Morell 2014). For Yochai Benkler (2006) the emergence of such digital commons has far reaching implications. Online collaboration gave rise to a new phenomenon he named *commons-based peer production* (CBPP), an emergent model of economic production that can outperform the traditional managed firm (Benkler 2006):

> *"Free software [...] suggests that the networked environment makes possible a new modality of organizing production: radically decentralized, collaborative, and nonproprietary; based on sharing resources and outputs among widely distributed, loosely connected individuals who cooperate with each other without relying on either market signals or managerial commands. This is what I call "commons-based peer production."" (Benkler 2006, p. 90)*

In the wake of Benkler's definition, numerous thinkers have seen digitally-enabled sharing as a potential for a radical economic transformation (Bauwens 2006; Botsman and Rogers 2011; Bollier and Helfrich 2012; Rifkin 2014). Popularizing the notion of Sharing Economy, Botsman and Rogers (2011) attracted the most attention with a narrative where online collaboration enables a greater access to unused resources such as a spare room in an apartment. In just a few years though, from a declared alternative to hyper-consumption, the

Sharing Economy has been reframed by start-ups and their venture capitalists as yet another economic opportunity to extract wealth (Martin 2016), or what Evgeny Morozov (2013a) had early dubbed as “neoliberalism on steroids”. This appreciation is confirmed by a review of the literature (Murillo et al. 2017) as well as through the documenting of the increasing job insecurity inherent of the “gig economy” (Friedman 2014; Stefano 2015). The Sharing Economy has become synonym of “abusing the commons” (Healy and Gibson 2017). Facing this situation, commons-oriented movements spearheaded by organizations such as Shareable, Ouishare or the Peer2Peer Foundation have been the crucible of intense debates in imagining alternatives (Gorenflo 2015), eventually crystalizing around the concepts of Open Cooperativism (Conaty and Bollier 2015) and, in particular, Platform Cooperativism (Scholz 2016). In these approaches, peers are co-owning the platform and in some of the intended applications, municipalities are also envisioned as collaborative entrepreneurs in such cooperatives with ideas such as Munibnb: an alternative to Airbnb (Schor 2016; Scholz 2016).

Notably, the urban dimension has been quite absent from the digital commons discussion. However, the general question of the role of local governments facing the challenges (and opportunities) brought upon by digitalization has been largely discussed with the emergence of the Smart City discourse (Hall et al. 2000; Hollands 2008; Neirotti et al. 2014; Nam and Pardo 2011, 2011). Successfully marketed by IBM (2009) at the end of the 2000s the concept has imposed itself as the dominant narrative articulating the digitalization of urban systems and has received tremendous support by policy makers (Caragliu et al. 2011). It has also received a large number of critiques for pushing down on local governments and their citizens a technocratic and market driven vision of city governance (Greenfield 2013; Sennett 2013; Kitchin 2014; Townsend 2014). Set in a neo-liberal ethos (Kitchin 2014), the wide-spread Smart City narrative does not conceive commons.

In stark contrast to the verticality of this approach, David Bollier (2016), an early and outspoken advocate of the commons, outlined a vision of how digital networks may transform the city into an open platform where local governments switch to a role of facilitators of empowered citizens who co-design their life conditions. In that process, for Jay Nath, Chief Innovation Officer in the Office of San Francisco Mayor “[open] Data is a medium for making government more porous” (Bollier 2016, p. 16). Liberated from enclosure by open licenses, open data is a striking example of a digital commons with a strong urban flavor; and,

possibly, an *urban* (digital) commons. And yet it has been seldom researched or documented as such.

1.2.2 The Urban Commons

Interestingly, the emergence of the urban commons as a focus of research came after the surge of interest in knowledge commons (Parker and Johansson 2011). At the start of this doctoral research in 2013, the concept of urban commons had only started to receive attention as such. In a literature review of the term, Parker and Johansson (2011) had mapped various types of resources that had been conceptualized as urban commons: urban space, ecosystem services, infrastructure and intangibles. The discussion of urban space as a commons often surrounded privatized public spaces such as condominiums (Chen 2008) or Business Improvements Districts (Foster 2011). For Foster (2011), who articulated the first comprehensive discussion of urban commons, these usually arise as an alternative to privatization when public management fails – a phenomenon she calls regulatory slippage – as in the case of the collective management of New York's Central Park. As a typical example, community gardens have previously been described as urban commons (Hess 2008): they are said to generate social capital (Foster 2006) and ecosystem services contributing to urban resilience (Colding and Barthel 2013). Urban infrastructure as well has been described as urban commons that face issues of maintenance typical to common-pool resources (Little 2005; Frischmann 2012).

Dellenbaugh et al. (2015) have pointed to the specific *urban* challenges with which urban commons are faced. Thus, urban commons are constantly struggling to survive amid over-regulation by the local state and appropriation by private interests (Dellenbaugh et al. 2015; Foster 2011). At the community level, urban commoners are constantly renegotiating community boundaries as urban life favors mobility and social differentiation (Dellenbaugh et al. 2015): it is the challenge of working together with strangers as Huron (2015) puts it . At the level of institutions, the challenge is to design processes that adapt to those constantly moving community boundaries as well as the scale of large cities, which may render face-to-face governance impossible (Dellenbaugh et al. 2015). It is sometimes a challenge of raising the necessary monetary capital to reclaim a resource from an urban landscape saturated with financial investment (Huron 2015), although commoning may well happen without formal ownership of assets (Colding et al. 2013). Dellenbaugh et al. (2015) recommend to not take the resource as a given but look at the processes of use, creation, and reproduction.

This actually does not stop at the resource: "There appears to be a dialectical relationship between commons formation and community formation: one does not necessarily precede the other" (Huron 2015, p. 970).

To accompany the development of urban commons, scholars call for reconceptualizing the role of local governments from a “command and control” approach to an enabler one, a facilitator of collective action and self-governance (Foster 2011; Bollier 2016). Foster and Iaione (2015) propose to transform the local state to a relational state that ultimately can be considered as a commons itself: the city thus becomes an institution for collective action (Foster and Iaione 2015). Such approach is being pioneered in Bologna with the passing of a regulation fostering the role of citizens in “the care and regeneration of urban commons” (City of Bologna 2014). In a similar approach, Bauwens and Niaros (2017) suggest the creation of public-commons partnerships that put the commons in the center instead of markets, whereas the “Partner City” and its institutions are seen as facilitating mechanisms to create the right public frameworks for individual and social autonomy towards urban commons transitions.

These explorative undertakings about ways to stimulate the urban commons are at odds with conventional urban governance practices. This is not neutral, it is critical:

> "*The impetus for much of this contestation is rooted in the neoliberal critique of contemporary urban development; namely the idea that public officials in cities around the world, and in particular “global cities,” are commodifying and selling to the highest bidders the collective resources of the city.*" *(Foster and Iaione 2015, p. 1)*

Reclaiming urban commons is often seen as an opportunity to rewire cities towards social justice and ecological sustainability. Community gardens for instance have been described as *green* urban commons that provide high biodiversity, local fresh produce, as well as social capital (Foster 2006; Colding and Barthel 2013). The reconceptualization of energy as a local commons is also seen as a way to accelerate energy transitions through cooperative ownership models of productive capacities (Moss et al. 2015). In this context, there is an emerging trend towards talking of commoning as a verb (Linebaugh 2008), emphasizing the dynamic nature of the process and pointing towards the practices that lead to reclaiming, generating, and maintaining the commons.

1.2.3 Methods and Tools for Researching the Commons, Niche Innovations and Alternative Economies

In an early phase, commons have largely been researched through small-N case studies establishing processes and relationship and, as data accumulated, it progressively included more large-N comparative analysis (Poteete et al. 2010; Ostrom 1990). Nevertheless, calls for more synthetic and comparative research have remained largely unanswered in face of the complexity of cross-national research endeavours (Poteete et al. 2010). Similarly, the study of digital commons and urban commons being in their first decade the literature only displays small-N studies with some research projects that started to pave the way towards more synthetic research by collecting larger numbers of cases (P2P Value; DSI4EU; LABGovCity 2018; Shareable 2018). An exception is work by Schweik and English (2013) reviewing very large datasets of FOSS (Free/Libre and Open Source Software) commons, tapping into the database of programming collaboration website Sourceforge.net. Amongst these the use of the Institutional Analysis and Development framework is largely dominant and has been shown to be instrumental in aggregating synthetic work and constituting a shared epistemological baseline for establishing the commons phenomenon (Ostrom 2009; Poteete et al. 2010). Nevertheless, this approach has also been criticized for its naturalist penchant and the way it tends to artificially separate the natural from the social, the material from the immaterial (Bresnihan 2016). This critique of a naturalist understanding of the commons finds its source among feminist scholars (Federici, 2001; Shiva, 2010) and geographers (Blomley, 2008; St. Martin, 2009). Alternatively, a growing number of authors opt for the verb form *commoning* to signal their understanding of the phenomenon as a socially situated practice (Bollier and Helfrich 2015; Bresnihan and Byrne 2015).

Within the study of sustainability transitions, commons have not been thematized as such. However, the grassroots innovations stream of research has brought increasing focus on bottom-up dynamics (Seyfang and Smith 2007). As is usual for a relatively recent field, methodologies set in a positivist epistemology have focused on individual case studies and small-N comparative cases, often focusing on specific niches (Martin et al. 2015; Seyfang and Haxeltine 2012; Seyfang et al. 2014). Larger and more systematic data analysis is anecdotical. One such isolated effort is Feola and Butt's (2015) study of spatio-temporal diffusion of grassroots innovations relying on medium-sized available datasets. Marginally, the sustainability transitions community has also widened its methodological scope from solely descriptive-analytical to more process-

oriented epistemological approaches such as action research (Wittmayer and Schäpke 2014). Such an orientation is at the core of the diverse economies research agenda, which is based on a performative epistemology rather than a realist or reflective one: there, the act of thinking and writing is seen as a performative ontological intervention (Gibson-Graham 2008). Another orientation of the community is an experimental rather than critical orientation to research (Gibson-Graham 2008).

This performative orientation has raised a key question: what are the techniques and technologies of performance (Gibson-Graham 2008)? Arguably, at a time of "technological hyperchange" which affects every aspect of how knowledge is governed and managed (Hess and Ostrom 2007a), this question should have attracted considerable attention as it certainly affects how data is collected, and facts manufactured and performed. It did only partly. And after decades of distaste for maps (Wheeler 2013), the field of geography shows renewed interest in them with the emergence of collaborative mapping. Borowiak (2015) for example showed that mapping was used by grassroots communities to make alternative economies more visible. Feola and Butt (2015) mined data in existing grassroots mappings elegantly addressing the lack of available data about bottom-up alternative experiments. Crowdsourcing of data is particularly relevant for geographic studies as shown by Goodchild (2007) in his depiction of what he named Volunteered Geography where citizens are seen as sensors. In this context citizen science is flourishing (Haklay 2013). In general, the wide availability of digital technologies for collaboration has drastically revived the concept of citizen science with scores of initiatives from mapping the moon surface to protein folding (Nascimento et al. 2014). Nevertheless, levels of agency of citizens are usually low in these projects with citizens often remaining mere "sensors" while ownership of the whole remain in the hands of scientists (Nascimento et al. 2014). Surprisingly, more than ten years since Hess and Ostrom's (Hess and Ostrom 2007b) *Understanding Knowledge as a Commons,* the commons framework, particularly adapted to raise questions about how shared (knowledge) resources are produced, used, and governed, has not yet been mobilized to address those questions in the context of participative research (citizen science, action research) on sustainability transitions. Similarly, the potential of digital commons as tools for performing alternative economies has been significantly ignored. The gap is remarkable.

1.3 Research Questions

Three clusters of research questions are introduced in order to illuminate this unknown territory: (1) researching as commoning and the contribution of the collaborative mapping of alternative economies; (2) unpacking the process of hybrid commoning locally; (3) exploring urban commoning as a transformative narrative.

1.3.1 Researching as a Commons: Collaboratively Mapping Alternative Economies

In “reading for economic difference” (Gibson-Graham 2008) the study of diverse and alternative economies has largely focused on depicting practices in individual locations. In a close academic field, the mushrooming of grassroots innovations (Seyfang and Smith 2007) has raised specifically geographic questions regarding their distribution and diffusion dynamics across spaces and along places (Feola and Butt 2015; Seyfang and Longhurst 2015). Some scholars have brought our attention to the fact that grassroots networks are often engaged in collecting systematic data about the community of practice they promote (Feola and Butt 2015; Borowiak 2015). Borowiak (2015) in particular has identified the use of mapping in making alternative economies more visible. These mappings are particularly meaningful as a way to make visible sustainable alternatives whose very existence is negated by mainstream capitalo-centrism (Gibson-Graham 2006b). Yet they are barely addressed by scientific efforts.

At the beginning of this research, in 2013, I had noticed the wide-spread use of more or less collaborative forms of mapping among grassroots actors to make their work more visible. I rapidly saw an opportunity for research using those mappings for a geography of sustainability transitions. From this interest, I became aware of a grassroots initiative launched by commons evangelist Silke Helfrich to federate those mappings into a commons as a strategy to increase the visibility of “all alternatives”[2]. I decided to integrate the initiative as an action researcher, actively participating – in contrast to solely extracting knowledge – in the commoning effort and continuously reflecting (Wittmayer and Schäpke 2014). This effort was aimed at understanding the contribution of digitally-enabled collaborative mapping to a geography of transitions reframed as a commoning endeavor. In combination with a descriptive assessment of existing mappings I investigated the following lines of discussion (Labaeye 2017):

2 , last accessed on 07/12/18.

1) What can we learn from individual maps when reframed as mappings?
2) How does the concept of performativitiy bring light to evaluating the transformational nature of knowledge derived from mappings?
3) What avenues does collaborative mapping offer for thinking citizen empowerment in (co)producing knowledge about alternative economies?
4) What new challenges are emerging from acknowledging the (digital) knowledge derived from these mappings as a commons?

1.3.2 Unpacking the Intertwin of Digital and Urban Commons Locally

In the initial phase of my research I also noticed that some local grassroots initiatives were using collaborative mapping as an instrumental tool to support the commoning of urban space. In three cases at least (596 Acres in New York City, Mundraub in Berlin, Flaechen in Leipzig) I was witnessing how a data commons of vacant land lots or unused fruit trees was elaborated by an online crowd as a basis for the reclaiming of public resources as commons, generating actual physical interactions. This strategic combination of an intangible and a tangible commons has never been analyzed or even documented as such in the commons literature. To understand this two-pronged process involving a digital and an urban commons I analyzed two separate cases through an adaptation (Frischmann et al. 2014) of the seasoned Institutional Analysis and Development (IAD) framework that has overwhelmingly been used in the study of the commons (Poteete et al. 2010).

The research questions are the following (Labaeye and Mieg 2018):

1) How does the hybrid process of constituting a data commons and reclaiming the related public space as a commons take place?
2) What is the role of grassroots organizations that provide the collaborative mapping infrastructure in this hybrid process of making commoning – i.e. producing a new resource or turning an existing one into a commons?

1.3.3 The Commons as a Paradigm for a Transformative Narrative of Urban Sustainability

The study of grassroots innovations (GIs) shows that they are value-driven (Seyfang and Longhurst 2015). Their influence in sustainability transitions lies in the challenge to mainstream regimes through the alternative discourses and knowledge they generate (Smith et al. 2016). Building upon this discursive power of GIs, Avelino et al. (2017) identified narratives of change as a key analytical element in their theory of Transformative Social Innovation. Understanding such narratives is often overlooked by a literature focused on a rather technical

understanding of innovation and the way it diffuses from the niche to the regime, instead of looking at how value-driven innovations influences those regimes (Seyfang and Longhurst 2015).

Practices associated with digital and urban commons at the intersection of the digital and urban spaces are challenging the mainstream narratives about digitalization and urban sustainability – e.g. smart city. Sharing Cities is an emerging discourse that has placed the commons at the centre of its transformative view of digitalization in cities (McLaren and Agyeman 2015; Shareable 2018; Fuster Morell 2018). In order to characterize the transformative scope of the Sharing Cities narrative and, in particular, the way it articulates the commons and digital technology, this doctoral research explored the following research questions:

1) How is the tension between communal and commercial sharing practices depicted in the Sharing Cities discourse?
2) What is the role of technology – and more widely of intermediation – in the practices depicted in the Sharing Cities narrative?
3) If at all, what arenas of norms, rules, and values (Harvey 2011) are being transformed by commoning practices of Sharing Cities ?
4) Are the initiatives depicted as constituent of Sharing Cities actually based on community-governed commons?

2 Summary of Articles

Three articles were prepared. This section presents a summary of the methods and materials involved, the main results and the discussion they triggered.

2.1 Article 1 – Collaboratively Mapping Alternative Economies: Co-producing Transformative Knowledge

In this first article I expose a phenomenon – collaborative mapping – that is of relevance to the (geographical) study of alternative economies. Defined by Healy (2009) as processes of production, exchange, labor/compensation, finance, and consumption that are intentionally different from mainstream (capitalist) economic activity, alternative economies may inform a solutions-oriented sustainability research agenda as called for by Miller et al. (2014). But beyond simple realist documentation, it is argued that bottom-up mappings may be seen as a grassroots contribution to a performative ontological research agenda about alternative economies (Gibson-Graham 2008). As a matter of fact, very few researchers have seized the opportunity of using such maps as data source and, even less, to acknowledge them as legitimate knowledge for identified sustainability alternatives. Largely ignored by academia, those maps deserve more attention. What do they look like? What information do they provide? How are they produced? Who is producing them? What is the role of digital equipment in these processes?

2.1.1 Methods and Materials

I provide answers based on my participation as an action researcher in Transformap, a collective initiated in 2014 with the mission of networking – technically and socially – existing mappings of alternative economies. This involved four different types of activities. First, we conducted an inventory of mappings using an online collaborative website (a wiki), collecting over 200 examples. Second, I conducted ten semi-directed interviews with grassroots map-makers to get a deeper understanding of the processes involved. Third, I contributed and co-facilitated an online conversation involving numerous actors involved in mapping alternative economies worldwide. Eventually, several face-to-face meetings were co-organized involving the collective members in designing a vision and outline of a socio-technical architecture for aggregating and interconnecting mappings. This process generated original knowledge insights that I reflected upon in this article, in my action research role of the

reflective scientist (Wittmayer and Schäpke 2014). These results are presented using real-types as well as ideal-types.

2.1.2 Results

Results of the inventory of mappings have shown that most initiatives focus on the country scale and the city scale. This is generally explained by the fact that many efforts emphasize a local dimension and that once started, online tools make the up-scaling to the national level straight-forward. Further up-scaling at continental or global scale is rendered more difficult by language barriers. Mappings are used equally for visualizing contested/normative concepts (commons, sharing, sustainability), generic themes (food, land, education), as well as identified practices such as urban foraging, community gardening, *etc.*. I further presented results as a three-pronged compass for navigating the world of mapping: it includes real-types of *products* and ideal-types of *processes* as well as *producers*. More than a third of the maps inventoried are directories of a defined practice or network. These are truly mappings as they are being constantly updated. Sometimes the crowd is responsible for these updates but most often a few individuals are actually maintaining data. Such mappings generally include very few categories as it covers a homogenous population of initiatives connected to a practice (e.g. hackerspaces or community gardens). Some initiatives (21% of the sample) map local projects associated to a loose concept (e.g. “transition” or “sharing”). Such mappings play a particularly interesting role in the emergence of alternative vocabularies from the bottom-up, and, as an effect, perform and make abstract concepts more palpable. This eventually brings convergence between various alternative practices and networks through the enactment of a collective identity. In these mappings, the level of control by the map providers varies a lot, emphasizing very diverse level of community participation: only rarely categories sorting data are open for crowd-participation. Furthermore, initiatives that map assets (16% of the sample) appear as strategic instruments in the development of commons-based alternative practices or economies. This finding motivated me to further investigate the intertwin of online mapping with the emergence of alternative urban practices as presented in my second article: there the Real-type that I showcased (596 Acres) is studied in-depth as a case-study. Although practical, this approach that separates products, from processes and producers is problematic: it suggests a separation between the map and its making and makers. In agreement with the literature, we found out that unless they are dead

initiatives, maps are really mappings, processual efforts (Herb et al. 2009; Kitchin and Dodge 2007).

2.1.3 Discussion

I have therefore discussed what we can learn from individual maps when reframed as mappings. Indeed, approached as maps, these may provide valuable data and information, if not knowledge for scientists studying alternative economies. However, such use should take into account that data may often be outdated. In addition, the lack of data versioning makes longitudinal studies uncertain at least. Importantly, I argued that the value of these mappings resides less in their raw data, but in understanding emerging ontologies and vocabularies used to describe and perform potentially just and sustainable alternatives. In particular, the exploration of the tensions that may arise within and between grassroots communities and networks while formalizing these seems critical to understand how alternative economies may scale, converge, and enter the mainstream. It is also critical to take into account that these mappings are operated through very diverse modalities (surveying, crowdsourcing, remixing/hacking, and online mediated participatory mapping known as map jams), considerably influencing their meaning and value.

In a second stream of discussion, I used the concept of performativity to explain the relevance of collaborative mapping to a geography of alternative economies. As already mentioned, such mappings seem to really fully deploy their potential when they are understood as instruments for performing the existence of a practice, a community, or of the availability of shared resources. In that sense, collaborative mapping is often an ontological intervention resonating with existing critical cartography scholarship (Crampton 2009). In that sense, it seems very well-suited as an addition to the set of tools and techniques available to researchers involved in the ontological project of performing alternative economies (Gibson-Graham 2008; Gibson-Graham and Roelvink 2011).

A third discussion avenue lies in the contribution of collaborative mapping for opening the box of how we think about citizen empowerment in the production of knowledge in a digital age. It is a discussion of an ethical nature. My results show that collaborative mapping is a practice that can empower citizens to perform alternative economic ontologies, answering a key concern about the demonstrated low citizen engagement in transdisciplinary and citizen science (Nascimento et al. 2014; Brandt et al. 2013). And as calls for scientists to engage collaboratively with citizens in the making of science for sustainability pile up

(Miller et al. 2014; Cornell et al. 2013; Wittmayer and Schäpke 2014), caution is required. Further research – and I provide worthy examples – is needed to understand how scientists may engage responsibly with citizens, ensuring that the former do not undermine the agency of the latter. Such work could serve to expand on existing studies such as Wittmayer and Schäpke's (2014), adapting them to the specifics and opportunities of digital engagement and its technologies.

Eventually, framing knowledge as a commons draws the researcher's attention to social dilemmas that may undermine its production, maintenance or diffusion (Hess and Ostrom 2007a). One of the main dilemmas that often undercuts the potential of collaborative mapping is the *de facto* enclosure of data. A demonstrated solution to this dilemma is the use of open licenses such as the Open Database License (ODbL) that allow sharing, reuse, and remixing of data sets while crediting sources. Supporting grassroots mapping initiatives to adopt open licensing may be a good entry point for researchers to "foster an environment where new facts can survive" (Gibson-Graham 2008, p. 629), as it would enable the necessary aggregation of data for bringing those mappings of alternative economies to scale. Beyond social dilemmas, digital commoning crucially depends on infrastructure being provided and such infrastructure is never neutral (Fuster Morell 2014). Digital infrastructure for online peer-production has significantly increased. However, most tools available are usually provided by commercial actors (e.g. Google) and trade-offs may be not be visible for commoners and so may compromise proper scaling of activities. Alternatively, digital infrastructure for knowledge commoning can be, and often is, provided as a commons itself (Frischmann 2012). A potent way for academia to support the commoning of knowledge on alternative economies may thus be supporting the infrastructure for collaborative mapping through contributing to maintenance, hosting, or further programming.

In conclusion, the value of grassroots mappings of alternative economies may lie less in the fact that they are untapped sources of data for scientists, but rather because they are performative, political and participative practices. In particular, mappings may be seen as performative ontological tools of alternative economies. Academia would benefit from approaching such mappings as instances of knowledge commoning that best unfolds when based on a digital infrastructure provided as a commons. Opportunities are plenty for academia to get involved in this commoning process, directly or more indirectly, by supporting the commoning of enabling digital infrastructure.

2.2 Article 2 – Commoning the City, from Digital Data to Physical Space: Evidence from Two Case-Studies

In this second article, we describe the phenomenon of commoning the city. This is understood as the co-production of new resources or the reclaiming of existing assets as urban commons. In this study, we describe and analyse two cases of a hybrid commoning process that involves the commoning of data and of physical resources. In both cases, data about the urban space (vacant lots and growing edibles) is being collaboratively produced or reclaimed and refined into an open and shared resource by a citizens' initiative — a knowledge commons. Yet, for both initiatives, that intangible commons is only a means towards an end; by being made actionable through the use of a mapping platform and further actions including community building, it results in a new, collective form of public land use: urban foraging on the one hand (Berlin); community spaces such as gardens on the other hand (NYC). Those which used to be neglected public assets — fruit trees and wasteland — are turned into shared resources that provide opportunities for community activities, reconnection to nature, food production, and DIY practices. At odds with a top-down smart city discourse, we argue that such examples may contribute to an alternative and citizen-centric narrative of the urban opportunities offered by digitalization. We asked the following questions: How does this (hybrid) process involving data and public space take place? What is the role of the digital and collaborative infrastructure provision in this process?

2.2.1 Methods and Materials

To analyse this process we relied on case study research as it is considered to be particularly suitable for explorative and evaluative research and supports conceptual refinement and theory development (Poteete et al. 2010). Following an overwhelming trend in commons research, these case studies were operated using an adaptation of the Institutional Analysis and Development framework for knowledge commons by Frischmann et al. (2014), applying the analysis to the tangible and intangible resources in parallel. It was achieved through an adaptation of Frischmann et al.'s representative questions (see table 1). Specific questions addressing the provision of a digital collaboration infrastructure were added benefiting from previous study of digital commoning (Fuster Morell 2014). Material was largely collected through existing online resources, especially as the research object is partly digital. A small number of semi-structured interviews with local initiative founders, public executives and users brought additional

insights. In the Berlin-based case, participatory research also brought additional investigation material. As we proceeded to describe results it appeared that we needed a way to distinguish what happens purely online from other activities that are clearly not online, but also not really offline. I thus crafted the neologism “onland” in order to reflect the fact that a practice is not happening online, but to suggest at the same time that it may involve some degree of connectivity to the Internet (e.g. mobile access), attuning to times of digital ubiquity.

Representative research questions to apply simultaneously to the intangible and tangible dimensions of the commoning process: (1) about and around data; (2) about and around physical assets.
Background Environment
• What is the background context (legal, cultural, etc.) of this particular commoning process and the default status of the resource involved (patented, copyrighted, open, or other)?
Attributes
Goals and Objectives
• What are the goals and objectives of the commons and its members, including obstacles or dilemmas to be overcome?
• What are the history and narrative of the commons?
Resource Characteristics
• What resources are pooled and how are they created or obtained? What are the characteristics of the resources? Are they rival or nonrival, tangible or intangible? Is there shared infrastructure?
• What technologies and skills are needed to create, obtain, maintain, and use the resources?
Community Attributes
• Who are the community members and what are their roles? What are the degree and nature of openness with respect to each type of community member and the general public?
Governance
• How is the participation infrastructure provided? Who has a say in its development? Does it allow horizontal organizing (i.e., without control/facilitation from the infrastructure provider)? Is the design of the infrastructure open? (added after Fuster Morell, 2014)
• What are the relevant action arenas; how do they relate to the goals and objective of the commons, and the relationships among various types of participants, and with the general public?
• What are the governance mechanisms? Who are the decision makers and how are they selected? What are the institutions and technological infrastructures that structure and govern decision making?
• What informal norms govern the commons?
• How do nonmembers interact with the commons? What institutions govern those interactions? What legal structures (e.g., intellectual property, subsidy, contract, licensing, tax, antitrust) apply?
Patterns of Interaction and Outcomes
• What benefits are delivered to members and to others (e.g., innovations and creative output, production, sharing, dissemination to a broader audience, and social interactions that emerge from the commons)?
• What costs and risks are associated with the commons, including any negative externalities?

Table 1. Operational framework for hybrid urban commons. Adapted from Frischmann et al. (2014)

2.2.2 Results

Results were presented separately for each case along the operational framework above (Table 1).

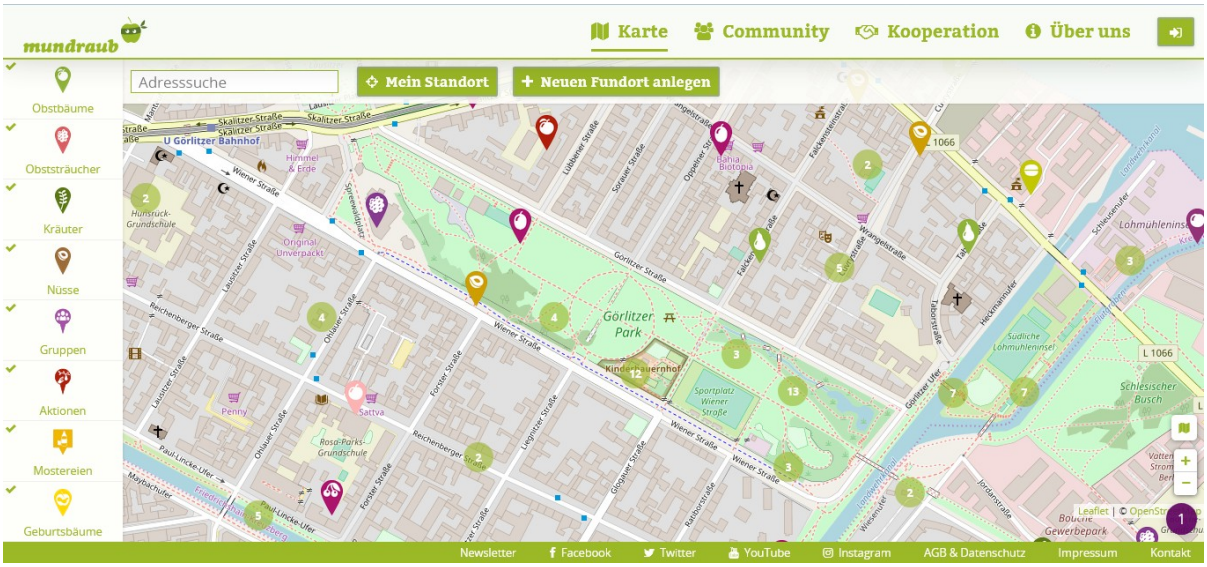

Figure 1. Screenshot of Mundraub's map displaying edible locations with individual pins and clusters of nearby locations. Source: (accessed 11 January 2017).

2.2.2.1 Reclaiming Urban Nature in Berlin

Since 2009, **Berlin-based Mundraub** is an initiative that encourages urban foraging through a collaborative mapping of urban edibles (Figure 1).

The *background environment* was one where tree cadasters were practically not accessible to the public, in contradiction with their public nature. The physical resource, the edible trees, could be foraged after asking for permission – a rule largely ignored by the public and not enforced. We observed a regulatory slippage (Foster 2011) in the management of trees because of lack of public resources and an inadequacy of rules with common sense: a typical precondition for the emergence of commoning. The *goals and objectives* of the Mundraub initiative is to enable people "to discover the secret fruits in public space and [eventually] to collectively shape the edible landscape" through the practice of urban foraging (Mundraub). The development of a digital commons in the form of a collaborative mapping is a constitutive tool of a wider process of bottom-up re-appropriation and re-purposing of traditionally top-down-managed public urban assets: from aesthetic greenery to growing edibles.

Resource characteristics differ strongly whether they are tangible or not: data are non-rival while edibles are. Mundraub's intangible resource is constantly being expanded, adding municipal sources in addition to the original crowdsourced data. The development and maintenance of the collaborative mapping infrastructure is organized by the Mundraub organization. On the physical level, edible trees are usually not favoured by the municipality because of its increased maintenance costs. After years of activity online and offline, pilot

projects have seen the administration partnering with Mundraub and other grassroots actors to let people plant and maintain fruit trees on public land, demonstrating a clear, although marginal, commoning pattern. Building a real *community* commoning data and fruit trees has faced considerable challenges and most actions (online and onland) are actually organized by the small staff (3-5 employees) of the Mundraub organization. On the *governance* side, users are not really involved in the development and operations of the digital infrastructure (collaborative mapping). The main actors in the commoning *process* are the Mundraub staff aside other grassroots networks who advocate and negotiate with the local government. Nevertheless, we detected that a more diffuse action arena lies in the everyday *practice* of urban foraging that takes places in public space, slowly transforming the way people interact with urban nature.

In terms of *outcomes*, Mundraub has curated the coproduction of an unmatched knowledge resource about growing edibles in public spaces. This visual information product serves the reframing of those physical resources as urban commons. On the ground, isolated success such as in Berlin-Pankow where the borough changed its rules for engaging with fruit trees and is testing the planting and maintenance of fruit trees by self-organizing citizens: if upscaled this would represent a radical transformation of *patterns of interactions* between people and their urban environment.

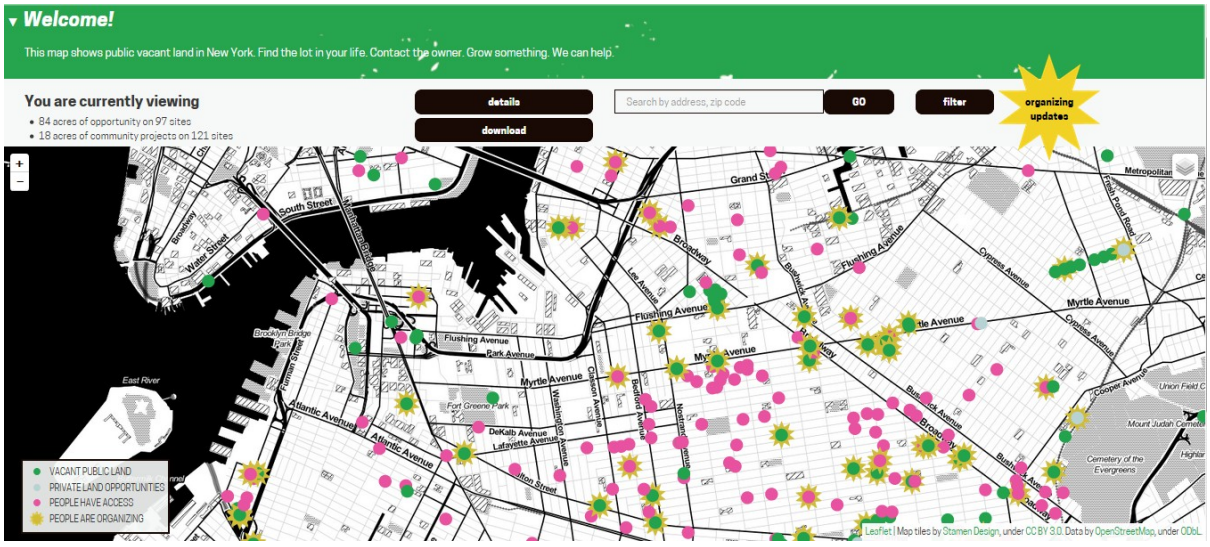

Figure 2. Screenshot of 596 Acres' map displaying various types of vacant land lots in New York City. Source: (accessed 11 January 2017).

2.2.2.2 Reclaiming Vacant Land in New York City

Since 2013, **596 Acres** has maintained an online collaborative mapping of vacant land lots in New York City and organized community access to these unused urban assets (Figure 2). The *background environment* of the initiative

was public data about land use enclosed by an exorbitant paywall. At the same time, while community gardening was already an established practice since the fiscal crisis of the 1970s, land available for community use was becoming scarce in a speculative market environment and made difficult by scattered public ownership among 23 (!) different agencies. Mainly active in under-privileged areas, the *goals and objectives* of 596 Acres are to support collective access to land in order to "spur bottom-up development that compensates for uneven growth" (596 Acres). To do so, digital commoning and community organizing are seen as key instruments, a crucial challenge lying in translating crude data into actionable information for residents that are not necessarily digitally literate and helping them regain control of public land in their neighbourhood.

Similarly to the other case, *resource characteristics* differ drastically whether they are tangible or not. Data are mostly open land use data that has been curated by 506 Acres' staff which provide the digital infrastructure for some level of online collaboration: matching of citizens organizing around a vacant lot. On the physical level, gaining access to land is difficult because of the market pressure, the complex bureaucratic procedures, and the challenges of collective action. Online interactions barely make for a *community,* in particular because they are usually only a starting point for onland meetings. The strategy of 596 Acres is less of building a community than a loose network channelling people towards the existing community gardening community. The *governance* of the commoning process barely involves online activities. However, the collaborative digital infrastructure developed by 596 Acres is available as an open-source resource and has been replicated successfully by groups in other cities. Onland, three action arenas could be identified: the *process* of gaining collective and formalized access to land, the punctual collective action to protect threatened community spaces, and the *practice* of self-governance internal to the life of community spaces. At all levels, negotiation with public authorities is involved and a rather supportive environment partly explains the success of the commoning process.

Patterns of interactions and outcomes: the commoning of land ownership data has provided grassroots actors with a very valuable informational resource for the onland footwork of 596 Acres that resulted in the creation of 36 new community spaces on former vacant land, strengthening the sense of community.

2.2.3 Discussion

This discussion section covers three streams: the relationship between data commoning and a wider process; the broadening of the roots of commoning from regulatory slippage to a collaborative state; and epistemological discussion suggesting a departure from the classical naturalist understanding of the commons.

2.2.3.1 Data Commoning: a Trigger for Wider Urban Commoning

In both cases, the commoning of data does not involve users in shaping rules for online interactions: the digital infrastructure for collaboration is provided by organizations. The focus of the commoning process is about converting the online activity into onland organization and action in the physical space. The two initiatives follow two different courses for expanding: Mundraub has scaled up in German-speaking regions with a focus on the digital commoning while 596 Acres focuses more on the local community organizing to allow other groups replicate it by reusing its online infrastructure, made available as an open source commons. Nevertheless, in both cases, the main action arena is surrounding the use of physical assets and space. The digital dimension of the two commoning processes is more a strategic one involving only the organizations are agents (not lay participants): the commoning of data is a trigger for a wider process and practices. We have also observed that infrastructure provision for participation goes beyond the digital level as the local governments show signs of shifting from controlling roles to a more enabling approach.

2.2.3.2 From Regulatory Slippage to the Collaborative State

Existing literature had typically explained the emergence of urban commons through the phenomenon of regulatory slippage: a marked decline in the public enforcement of rules and standards applying to public resources and spaces (Foster 2011). While partly confirming that finding, we have also shown that commoning may emerge as the result of strategic interventions that reframe idle public assets as resources for participative practices (e.g. urban foraging, community gardening). Such activation of public space may radically change its function and nature (Radywyl and Biggs 2013). On the one hand, as observed in our case studies and other places, data does indeed make government more “porous” (Bollier 2016, p. 16). It requires preconditions: it needs to be open, digestible – here civic actors are key in translating data into actionable information – and connected to collective action on the field. Data commons

require onland action to realize their full potential for commoning the city. On the other hand, the local state may play a collaborative and enabling role as a provider of onland participation infrastructure through adapting its policies and protocols, as done in a place like Bologna (City of Bologna 2014; Foster and Iaione 2015; Iaione 2016).

2.2.3.3 Departing from a Naturalist Understanding of Commons

The use of the IAD framework in analysing the hybrid process of commoning the city has enabled us to characterize an undocumented phenomenon. Nevertheless, it is seen as problematic, in particular while considering the performative nature of research (Gibson-Graham 2008). First, it creates artificial boundaries between intangible and tangible commons whereas in practice, we have observed a single community involved in a commoning process happening online and onland. Second, it tends to overemphasize the digital side of collective action that is in fact a strategic trigger of a much more complex process that happens onland, involving physical resources/spaces. This critique has already been formulated by Bresnihan: "While the distinction between the material/natural commons and the immaterial/social commons can be analytically helpful it tends to be over-stated, obscuring the continuity and inseparability of the material and the immaterial, the natural and the social." (Bresnihan 2016, p. 94). It is argued that focusing on resources and processes tends to naturalize a reality that is largely social and complex, performing a narrow neoclassical world vision (Bresnihan 2016). Breaking away from such a naturalist epistemology of the commons involves a shift towards using the verb form commoning that speaks of a living process (Bollier and Helfrich 2015) and moves away from the ontological divide between subjects and objects (Bresnihan 2016). We therefore argued that further research on commoning the city and the subsequent role of digital equipment should look at the *practice* of urban commoning while retaining analytical elements of the IAD framework. This article showed that documenting the commoning of the city is about uncovering a living practice of collaboratively producing a shared experience of the place, whether by picking apples or sharing information about their location. For such a practice to unfold, the provision of an infrastructure for collaboration is key and civic actors can complement the role of a more collaborative state.

2.3 Article 3 – Sharing Cities and Commoning: An Alternative Narrative for Just and Sustainable Cities

The Sharing Cities approach is presented as an alternative narrative about the opportunities raised by digital technologies in the city (McLaren and Agyeman 2015). This new discourse includes and transcends the sole sharing economy approach by acknowledging that in cities both commercial and communal forms of sharing may coexist. McLaren and Agyeman (2015) have outlined how such Sharing Cities may be conceptualized as the urban manifestation of a sharing paradigm that is itself rooted in the political economy of the commons. This new paradigm, they argue, can be a transformative force towards more just and sustainable cities (McLaren and Agyeman 2015). In order to evaluate this proposal, I tested it against a wide collection of case studies assembled by the non-profit online media Shareable in a book titled *Sharing Cities: Activating the Urban Commons (Shareable 2018)*. How far do those empirical elements substantiate or contradict the conceptual approach laid out by McLaren and Agyeman (2015)? This brings four lines of enquiry. Are sharing practices more community-oriented (communal), and therefore transformational, in contrast with a traditional commercial understanding of sharing which is largely transactional? While digital platforms are at the fore of the sharing economy or smart cities, what is the role of (digital) intermediation in Sharing Cities? With its transformational stance, the Sharing Cities discourse assumes that sharing impacts all domains of life. Therefore, I also ask what is actually shared in those cases. Going one step further, a last question checks whether a clear-cut commons (i.e. understood here as a community-governed resource) can systematically be identified in cases illustrating Sharing Cities.

2.3.1 Methods and Materials

The materials reviewed are the 137 cases compiled in Shareable's book *Sharing Cities* (2018). Half (69) depict initiatives which emerge from the grassroots. The other half (68) depict local policies that promote sharing.

In this article I rely on the more operational components of McLaren and Agyeman's proposal (2015). On the one hand, their "sharing paradigm" (figure 3) is an analytical tool for mapping sharing practices along two key dimensions. One continuum polarizes the motivations of the participants in a sharing practice, from more intrinsic ones based in a sense of community to more extrinsic such as commercial gain. Another dimension charters the degree of intermediation: from sociocultural or informal sharing to practices mediated by

third parties like a website or an app. This two-dimensional mapping is used to answer the first two questions, integrating the question of digital intermediation. Because this tool focuses on practices it is used to review only half (66[3] out of 137) of the cases: the other half being policies. This was achieved with a series of weighted questions: four for each dimension.

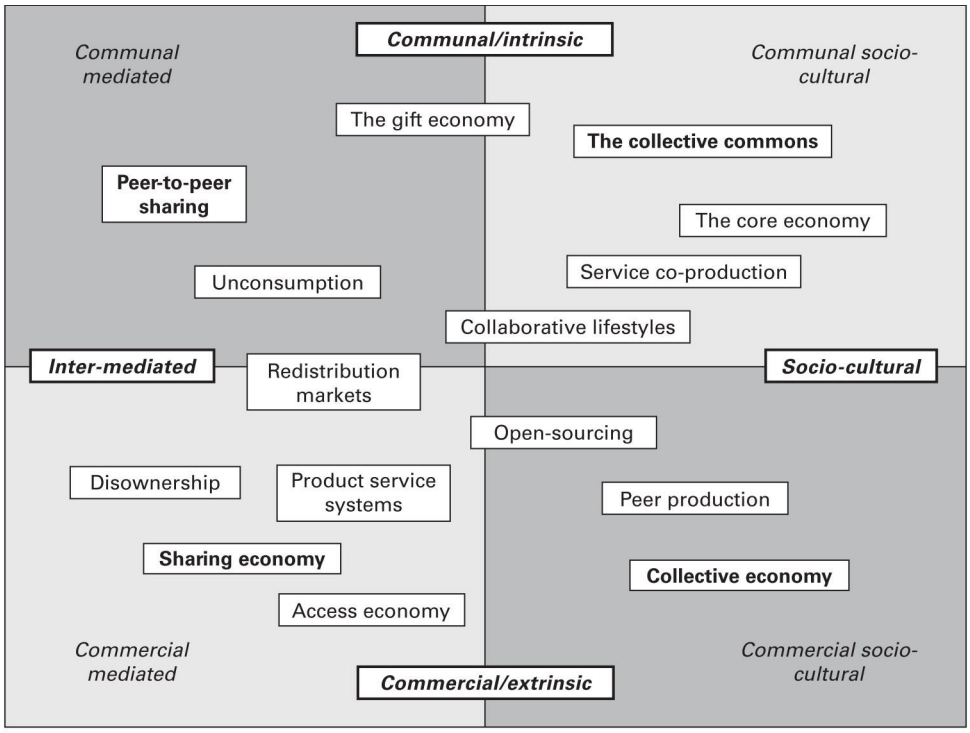

Figure 3: The sharing paradigm (McLaren and Agyeman 2015)

On the other hand, a “sharing spectrum” offers six sharing domains to map what is being shared, from the more tangible to the more intangible: material, production facility, product, service, experience, capability. This spectrum also connects each domain to an arena of production and social reproduction where sharing may result in changing norms. These arenas are based on David Harvey’s work (2011): : "forms of production, exchange and consumption; relations to nature; social relations between people; mental conceptions of the world, embracing cultural understandings and beliefs; labor processes; institutional, legal, and governmental arrangements; and the conduct of daily life that underpins social reproduction" – as quoted in McLaren and Agyeman (2015, p. 13). Each case is tested to evaluate which domains it affects.

Eventually, in order to test the presence of a commons, I took inspiration from Ostrom’s definition (Hess and Ostrom 2007b, p. 3) and cases considered as “purely commons-oriented” are those where a clearly identified resource is being

3 Three cases ranked as bottom-up initiatives by the authors clearly display characteristics of policies, hence the discrepancy in numbers.

shared by a group of people who manage it collectively, through a set of rules and beyond state governance or market mechanisms. Commons are also increasingly described as the relational social framework formed by the resource, the community and the rules (Bollier and Helfrich 2015, 25,2). Therefore, when either a shared resource, a collaborative practice, or a community is present (i.e. not at the same time), cases are counted as only “having a commons element”. All other cases are categorized as setting the stage for commoning, trusting the assessment of Shareable’s editing team (Shareable 2018), although this might be matter of contention.

2.3.2 Results

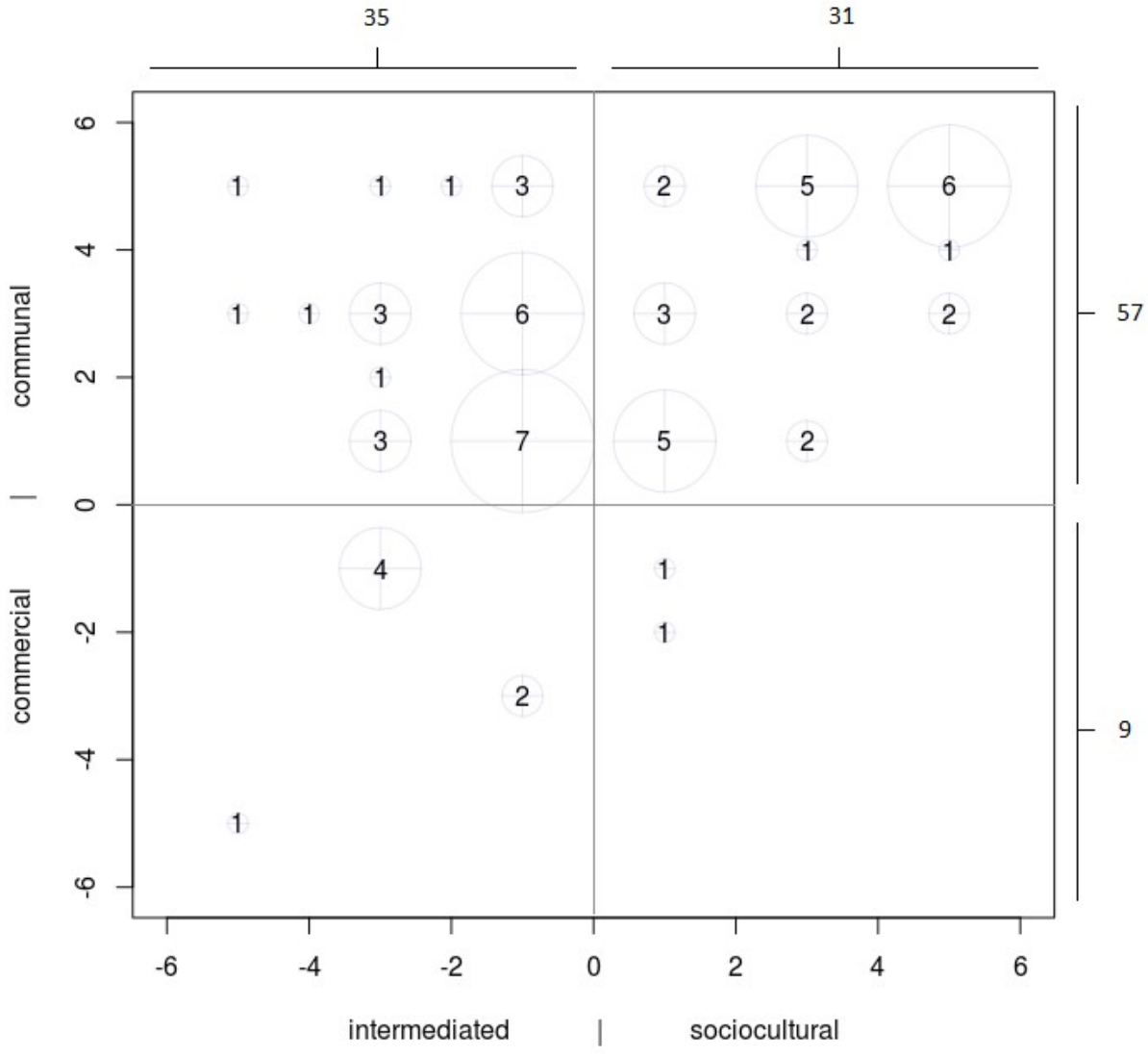

Figure 4: Cases distributed across the sharing paradigm

Mapping cases along Mclaren and Agyeman’s *sharing spectrum* and its “four flavours of sharing” has taught us that Shareable’s coverage of sharing practices is largely focused on communal practices (86% of cases); although the degree of

communality varies a lot from one case to another (Figure 4). Shareable's selection to flesh out the Sharing Cities narrative has clearly privileged a communal orientation, in consistence with its introductory statement that "the commons needs to be elevated to a dramatically higher level of importance in urban development, but not to the exclusion of the state and market" (Shareable 2018, p. 32). On the dimension of intermediation, the distribution of cases is more even. A little over half display some degree of intermediation, and two thirds of those resort to a digital platform. This means that just over a third of cases involve a digital platform. Intermediation apparently plays two key types of roles: it enables the organization of a relatively complex service/practice and it may be an instrument to scale up a practice. Two main clusters have been identified. One covering cases with a high degree of communality and highly socio-cultural: e.g. walking school buses, repair cafés, guerilla urban gardening, etc. Another cluster groups cases with light intermediation and rather more communal: e.g. student housing mixed with senior housing, pay-it-forward restaurant, cooperative investment fund for local food, etc. From this assessment, very few cases (2) combine a sociocultural (i.e. not intermediated) with a commercial flavor.

By asking the question of "what is being shared?" I found that two thirds of the cases involve either sharing of a *production facility* (36%) or of a *capability* (33%). On the more tangible end of the spectrum, production facility was often understood as *re-production facilities*. Indeed, the classification of practices involving housing makes it clear: housing is about tangible space – a facility – enabling the reproduction of social life and productive capacities. However, such as in the case of finance, a production facility may also cover less tangible realities such as organizations. At the other end of the spectrum, many cases describing policies were ranked in the *capability* domain. For many policies, it was difficult to identify a domain being involved in a sharing practice and, conversely, these arguably contributed to the equal capabilities of citizens to achieve a potential towards social justice (McLaren and Agyeman 2015, p. 205).

Another question asked was on which arena of production and social reproduction *sharing* may result in changing norms. I found out that cases usually touch several arenas simultaneously. This exploratory review suggests strongly that sharing approaches are usually transversal, not limited to one arena of production and reproduction. One case, the Urban Agriculture Zone in San Francisco, even impacting all arenas. Specifically, "Forms of production, exchange and consumption" were potentially impacted in 75% of the cases and

“institutional, legal and governmental arrangements” 65%. At the other end of the spectrum the least impacted arenas were “relations to nature” (38%) and “labour processes” (26%) raising doubts about the potential for the Sharing Cities narrative to address socio-ecological issues as it claims.

26% of the cases display a clearly distinguishable urban commons: a case where a community has direct and collective agency on a specific urban resource. Many of those involve land, as if the tangible nature of the resource favored the emergence of collective action and self-governance. Nevertheless, in some case like the walking school buses, the commons is purely intangible. Other cases navigate at the intersection: such as free internet access with the Freifunk mesh-network in Germany, where the commons is rather intangible, but relying on physical (routers, servers) as well as intangible (code) infrastructure. Very few examples depict long-standing commons. One exception is the Begum Bazaar, a self-organized high-street in Hyderabad in India that resists pro-car urban development. Since half the cases are describing local policies, there is a great emphasis on the role of local government towards commons. Thus, some self-organized practices have been recognized by local authorities, such as the Brixton Pound, an alternative currency with which people can pay local taxes. Some 46% of cases present some commons elements: the strong role played by market mechanisms or public institutions excluding them from being considered as purely commons-oriented. These include, among others, many cases involving a cooperative organizational setup and local initiatives from governments around open-source software or open data. Generally, the central role played by a third party is what distinguishes cases with commons elements from more unambiguous commons where the community is central in organizing use and reproduction of the shared resource. 28% of cases were assessed as setting favorable conditions for the emergence of commons-oriented practices. Some may clearly directly encourage such (e.g. Barcelona pro-commons policy), others may create framework conditions favorable to such practices (e.g. participatory local governance). In addition, as pleaded by Gorenflo in his introductory comment (Shareable 2018, p. 29), the re-localization of production may form a first step towards the reclaiming of resources such as food or energy as a commons.

2.3.3 Discussion

These results lead to a discussion on the role given to technology and intermediation in the Sharing Cities narrative. While Mclaren and Agyeman

situated it at the intersection of the urban and cyber space, suggesting that digital technologies would play a crucial role, the cases put forward by Shareable show that the majority of examples are not digitally based. This is at odds with the sharing economy or platform economy narratives that usually see digital platforms as a defining feature but confirms new literature that has focused on the urban dimension of sharing (Boyko et al. 2017). In addition, where digital technology is involved, cases have often favored examples where it is open source – giving back ownership to communities and aligning with the commons paradigm, potentially giving new impetus to marginal literature on Open Source Appropriate Technology (Pearce 2012). More recently, this discussion has been captured by the Platform Cooperativism concept and movement also depicted in the Shareable book and advocating co-ownership. One strand of this approach has focused on emphasizing ownership by local communities as a way to counter extractive models such as Airbnb and Uber (Scholz 2016; Schneider 2018). The absence of such examples in the book is explained by the fact that these are still at the stage of concept, but long-awaited initiatives start to appear such as FairBnb (Másson Maack 2018). Similarly, many tech enthusiasts have seen in blockchain technology the opportunity to disrupt monopolistic sharing platforms (Huckle et al. 2016; Rustrum 2018; Vilner 2018). However, reality seems to disagree. Thus, a deep conflict of ownership among core participants of Arcade City (a celebrated blockchain-based Uber alternative) has confirmed the fact that traditional issues of power and collective ownership cannot be “programmed away” (P2P Foundation 2016). By choosing to omit a potentially over-hyped technology, Shareable’s narrative of Sharing Cities navigates the topic wisely, avoiding the shallow grounds of technological solutionism (Morozov 2013b), and, instead, bringing light to collective ownership and commons-based models.

Addressing the transformative potential of the Sharing Cities, two main lines were discussed. First, the issue of trans-locality and replication illustrates the horizontality of transformative processes. Indeed, the fact that a social innovation changes institutions in more than one isolated experiment is what qualifies it as a transformative social innovation (TSIs) (Ruijsink et al. 2017). Some of the cases depicted in Shareable’s book are already TSIs: repair cafés, walking school buses, or Fablabs. However, many others have locally co-evolved and are yet to be replicated (Hansen and Coenen 2015) or scaled-out (Manzini 2015): which is the very purpose of Shareable in assembling this sort of Sharing Cities cookbook, a performative intervention (Gibson-Graham 2008), providing an important niche resource for the diffusion of grassroots innovations (Seyfang

and Longhurst 2015). Second, positioned “beyond the post-political trap” the Sharing Cities inevitably involve a more vertical transformation with the aim of “sharing the whole city” (McLaren and Agyeman 2015, p. 5). This idea resonates with others (Foster and Iaione 2015; Iaione 2016) who propose to rethink the city itself as a commons: an institution for collective action. For Bauwens and Niaros (2017) who have identified similar commons-oriented political coalitions in the cities of Frome, Milan, and Ghent, the horizontal and translocal dynamic of bottom-up commoning initiatives needs to be completed by a vertical political dynamic that remains participative. On this something of a blindspot, the urban commons literature could learn from the transition management literature applied to urban contexts that has explored ways to facilitate the local upscaling of transitions initiatives (Roorda et al. 2014).

In a third stream of discussion, I pointed to a contradiction. On the one hand, the case review confirmed the centrality of the commons in the Sharing Cities narrative. It adds to a growing amount of evidence that commons play in transitions towards just and sustainable cities (Radywyl and Biggs 2013; Foster and Iaione 2015; Chatterton 2016; Bauwens and Niaros 2017). On the other hand, the cases demonstrate that they impact the arenas of relationship to nature and labour processes the least, contradicting somewhat the latter. A couple of methodological biases are considered, but the discussion focuses on the epistemology of the commons. It draws on an ecofeminist perspective to challenge the classical and naturalist epistemology of approaches as of Ostrom, proposing instead of redefining commons as commoning, a verb, stressing that it is less an object than an activity “that expresses relationships that are inseparable from relations with nature” (Linebaugh 2008, p. 279). Set in a relational epistemology, (urban) commoning is necessarily more-than-human (Bresnihan 2016). This refocuses the identification of a commons to identifying *commoning-communities* composed of humans, organizations, non-humans, animate and inanimate entities (Gibson-Graham et al. 2016). This relational and post-natural perspective seems inevitable to adapt to the reality of the Anthropocene (Decuypere et al. 2019; Arias-Maldonado 2016). With this reframing I revisit briefly three cases from *Sharing Cities (2018)* where commons were not identified following a classical, Ostrom-like, definition, but where commoning-communities appear clearly. These illustrate the local emergence of a new ecosystemic worldview based on interdependence (Scharmer and Kaufer 2013; Klein 2014; Giorgino and Walsh 2018). Eventually, I noted that the sustainability literature is increasingly interested in investigating the potential of

mindfulness practices in facilitating the emergence of such worldview (Scharmer and Kaufer 2013; Böhme et al. 2018). Doran (2017), in particular, argues that the surge of mindfulness practices may contribute to create spaces for commoning. Cities being hotspots for the development of such practices it may be relevant to integrate them in a Sharing Cities narrative rooted in more-than-human commoning.

2.4 Overall Results

Overall, five transversal results emerge from these three independent pieces of research.

(i) I have concluded that digital commons and urban physical commons may be two faces of the same urban commoning process or practice. Methodologically, this challenges the established Institutional Analysis and Development (IAD) framework that is still overwhelmingly used in the study of the commons and cannot properly handle this two-dimensional reality of the resource.

(ii) This leads to the central result of this cumulative doctoral research: It is necessary to reframe digital and urban commons as (urban) commoning. In a first phase, I defined commoning as the process of reclaiming, maintaining, and (re)producing digital and/or urban commons. This was inevitable to study one urban process where the formation of two commons (a digital and a physical one) was the targeted outcome. The commons was not a given. In addition, the digital commons was largely a means for an end, which was the commoning of community land use. Nevertheless, twice in this research (Article 2 and 3) methodological caveats compelled a deeper reframing of commoning. On the one hand, using the IAD framework – the conventional option in studying commons – for the analysis of a hybrid process of commoning clearly showed epistemological limits by creating artificial divides (tangible/intangible, resource/community), obscuring the comprehension of the phenomenon as a multidimensional social practice. On the other hand, conceptualizing commons around a focus on a resource produces a performative blindness to practices that do not fit established categories and may lead researchers to miss out on significant commoning initiatives that articulate more sustainable worldviews locally. In a second phase, I suggest that these difficulties are lifted by following scholarship

(Linebaugh 2008; Bollier and Helfrich 2015; Bresnihan 2016; Gibson-Graham et al. 2016) that reframes commoning as a relational phenomenon putting commoning-communities and their practices in the centre of the analysis. With inspiration from ecofeminist approaches, **urban commoning can be defined as a relational practice of developing and providing care to more-than-human partnerships for the reproduction of life in the city.**

(iii) Another significant and surprising result of this research was to find out that digital platforms and tools are not as central as expected in the phenomenon of commoning the city. Indeed, both my in-depth case studies in New York City and Berlin and my review of 137 secondary cases demonstrate that urban commoning is not predominantly a digital phenomenon. While it certainly plays a role in a world where digital tools are ubiquitous, urban commoning-communities are not mainly active *online* but rather *onland*. I crafted the neologism “onland” in order to reflect the fact that a practice is not purely happening online, but at the same time may involve some degree of connectivity to the Internet. On this note, I discarded from the focus of this doctoral research a whole project on urban foraging after conducting 23 interviews of practitioners across three cities (Boulder, Berlin, London), because (negative) results were showing that digital commons (maps of foraging locations) play an insignificant role in the everyday practice.

(iv) This research has found no conclusive evidence that urban commoning would have led to deep transformative impact locally. However, there is indication that it provides a framework to conceptualize and accompany the local state in mutating from a role of Leviathan to a one of a facilitator of self-governance at the intersection of the urban and cyber spaces. This seems particularly relevant at a time when local government is faced with austerity politics, global disruptive sharing platforms, and the unrolling of pro-market smart city policies. Nevertheless, there is strong indication that commoning practices are replicable, that they can be out-scaled across locations provided that they are adapted to local contexts. This is yet another contribution to the study of sustainability transitions and the role of grassroot innovations.

(v) Through my exploration of the field of collaborative mapping I provided an overview of grassroots practices that produce information and knowledge about alternative economies. This provides researchers

interested in the systematic study of bottom-up initiatives with inspiration for approaching participative research in the digital age. In this context, it suggests the use of the commoning paradigm for framing collaboration between scientists and citizens.

3 Discussion

In this final discussion section, I contextualize the main contribution of this doctoral research – namely the shift from a focus on digital and urban commons to urban commoning – against existing literature and formulate an outlook for future research.

3.1 The Intertwin of Digital and Urban Commons

Some literature that is both previous and contemporary to this doctoral research has pointed in the direction of a connection between digital and urban commons. David Bollier (2016) suggests that through the rise of digital civic networks that emulate the open source ethic and practice one can rethink the city as a platform for bringing more people into the process of urban governance. Similarly, exploratory work pointed at digital infrastructure such as participatory maps, open data, and online organizing tools as supports to commoners and urban commons (Le Crosnier and Vidal 2017). However, and surprisingly, these authors do not conceptualize the digital infrastructure as a commons. Some authors point to that direction though. Thus, in outlining the concept for the Co-City, Iaione (2016) imagines that web 2.0 networks and what he called wiki-commoning could play an instrumental role in connecting everyday makers with urban commons. Through the concept of Hybrid City, the editors of the Special Issue, where I published my second paper, point to the fact that peer production in the urban space is facilitated by digital tools but is also manifested in the physical space (Travlou et al. 2018). In separate literature it is seen as important that these digital tools are provided as commons (Kostakis 2018; Ossewaarde and Reijers 2017; Pazaitis et al. 2017). Bauwens & Niaros (2017) propose the hypothesis that knowledge commons are increasingly intertwined with material locations, within the urban commons. Overall, it is probably Bresnihan & Byrne (2015) who best express it: " The urban commons [...] integrate people, physical space, materials, technologies and knowledge" (Bresnihan and Byrne 2015, p. 46) and more generally, "while the distinction between the material/natural commons and the immaterial/social commons can be analytically helpful it tends to be over-stated, obscuring the continuity and inseparability of the material and the immaterial, the natural and the social" (Bresnihan 2016, p. 94).

3.2 From Commons to Commoning

The last five years have seen a growing number of authors arguing for a shift from commons to commoning (Dwinell and Olivera 2014; Bresnihan and Byrne 2015; Bollier and Helfrich 2015; Gibson-Graham et al. 2016; Zhang and Barr 2018). These systematically refer to Linebaugh (2008), for whom the transition to commoning as a verb is preferable to avoid misrepresentation: "To speak of the commons as if it were a natural resource is misleading at best and dangerous at worst—the commons is an activity and, if anything, it expresses relationships in society that are inseparable from relationships with nature" (Linebaugh 2008, p. 279). They are not essentially material things but are social relationships, constitutive practices and a relational political project (Gibson-Graham et al. 2013; Caffentzis and Federici 2014; Bresnihan 2016). For Bollier & Helfrich focusing on commons as things or resources may distract us from its most important engine: "the consciousness of thinking, learning, and acting as a commoner" (Bollier and Helfrich 2015). Commoning stresses the fact that commons are not given, they are not static: they are produced, created or actively protected and reclaimed from enclosure (Linebaugh 2008; Dwinell and Olivera 2014; Caffentzis and Federici 2014); they are an active and living process (Bollier and Helfrich 2015). Commoning points to the dialectical relationship between the commons formation and its community, one not necessarily preceding the other (Huron 2015).

As stated by Linebaugh (2008), commoning expresses relationships in society that are inseparable from nature. For Weber, the commons is an ontology of relationships that “emphasizes a process of transformation and identity formation that arises out of a mutuality that is not only material, but also experienced” (Weber 2015, 371). Taking distance from a classical and dualist ontology that separates objects from subjects and nature from culture, various authors talk of more-than-human commons/commoning rooting it in a relational ontology (Bresnihan 2016; Gibson-Graham et al. 2016; Walsh 2017). Commoning is seen as a way to work in partnership with the more-than-human world, an imperative in the face of climate change and mass extinction (Roelvink et al. 2015).

Eventually, Gibson-Graham et al. (2016) propose commoning as a post-capitalist politics for a time – the Anthropocene – when we need unprecedented action at all scales for rapid social and ecological transformation. They argue that commons and commoning are still too often framed from a capitalocentric point

of view thus limiting its potential as a politics for the Anthropocene. With the term capitalocentrism, Gibson-Graham (2006b) names “the way that a diversity of economic relations are positioned as either the same as, a complement to, the opposite of, subordinate to, or contained within “capitalism”" (Gibson-Graham et al. 2016, p. 194). For example, a deep history perspective, beyond capitalism and modernization, forces us to reconsider ourselves as a species depending on other species to survive (Chakrabarty 2009). A post-capitalist view of commoning is less focused on the issue of enclosure and the discussion around property that it entails, showing that resources may be commoned through the commoning of access rather than ownership (Gibson-Graham et al. 2016, p. 198). Generally, in post-capitalist commoning the focus of analysis is displaced from natural resources and human communities to more-than-human commoning-communities:

> *“The agent of change, the commoner, is no longer (and perhaps never was) a person or a category such as the working class but an assemblage. Certainly these assemblages include humans, but they also include non-humans; they may include class but also non-class alignments; they may include social movements and grassroots organisations but also governments, institutions and firms; they may include non-market mechanisms but also markets; they may include animate beings who have nothing in common except breathing and living, but also inanimate entities that share an existence on this planet." (Gibson-Graham et al. 2016, p. 210)*

Such communities are not always easily recognizable even to themselves and it falls on social scientists to seek out connections and associations that will help construct emerging commoning-communities (Gibson-Graham et al. 2016). Researching commoning-communities is therefore a performative ontological intervention bringing into the world an alternative (post-capitalist) economic reality (Gibson-Graham 2008; Roelvink 2015).

3.3 Outlook for the Research of Urban Commoning

In this last section I present some of the research directions that stem from the above discussion.

1. The shift towards a relational epistemology of commoning is sometimes accompanied by the use of assemblage thinking (Gibson-Graham et al. 2016). As reported by McFarlane (2011), in Deleuze’s conception, assemblages are “a

multiplicity constituted by heterogeneous terms and which establishes liaisons, relations between them" (Deleuze and Parnet 2007, p. 52). The assemblage method enacts more-than-human networks, associations that extend beyond local boundaries (Roelvink 2015). This inevitably leads to consider urban commoning-communities in their wider social, political, technological and ecological context. This may raise stimulating discussion on the opportunity of perpetuating a blurring urban/rural divide in the time of the Anthropocene. It also allows for thinking of digital technologies in a critical way, transcending artificial and dualist divides such as online/offline as well as paying critical attention to the powerful capitalist interests shaping technology. This latter point would further support a discourse of economic difference (Gibson-Graham 2008) in a field where emerging technologies (blockchain, artificial intelligence, etc.) are pre-empted by narratives (e.g. Smart Cities, Big Data, Internet of Things) plagued by technological solutionism (Morozov 2013b) and rooted in a neoliberal ethos (Kitchin 2014).

2. Gibson-Graham argues that commoning, as post-capitalist and diverse economic form, is best described through thick description combined with a weak form of theory (Gibson-Graham 2014) for "weak theory could not know that social experiments are doomed to fail or destined to reinforce dominance; it could not tell us that the world economy will never be transformed by the disorganized proliferation of local projects" (Gibson-Graham 2008, p. 619). Thick description extends the observation from material practices "to the nuances, affects, multiple codes of meaning, silences, jokes, parodies, and so on, that accompany them" (Gibson-Graham 2014, p. 148). In turn, weak theory does not confirm what we already know, but observes, interprets and yields to emerging knowledge (Gibson-Graham 2014). Improbable urban commoning-communities may thus appear, such as the Cooling the Commons research project, revealed by showing the combined role of green spaces and of transgressive use of commercial centres to provide access to a "cooling commons" during heat-waves in Australia (Healy and Gibson 2017). Such a methodological orientation for researching (urban) commoning would mean greater resorting to an ethnographical stance.

3. My own results also suggest that researchers could engage more with bottom-up initiatives that are involved in the collaborative mapping of alternative economies to de-multiply the effort of identifying (urban) commoning-communities. Collaborative cartography, with its strong visual appeal and its participative nature, seems a particularly powerful instrument with which to

perform the identification of commoning-communities as pioneered by Safri et al. (2017). This would answer calls to reclaim the map as a key tool for (human) geography (Dodge and Perkins 2008; Herb et al. 2009) and in turn constitute a significant offering to the research of commoning from a geographic perspective.

4. In order to engage actively with the ethical dimensions that arise from action research I have suggested to use the commoning paradigm to reflectively conceptualize the relationships between the various subjects involved in the effort of producing novel knowledge (Labaeye 2017). This broadens proposals to consider academia (Bollier 4/26/2010) or the university-space as a commons (Healy and Gibson 2017), extending the idea to research per se. It offers a conceptual terrain to engage with questions of how shared knowledge is (re)produced, distributed and accessed in the discussion about the modalities of a citizen science that would reconnect to its original premise of being a science *by* and *for* citizens to make sense of environmental threats (Irwin 1995). In a time where the status of science is increasingly challenged by the reactions generated by the cognitive dissonance of climate disruption and mass extinction, knowledge commoning may offer a promising route to rebuild public trust and adhesion.

5. The identification and documentation of (urban) commoning-communities would naturally contribute to the study of grassroots innovations (Seyfang and Smith 2007) and transformative social innovation (Avelino et al. 2015) in the context of sustainability transitions. It could enrich the later by opening discussion around ideas characteristic of the Diverse/Community Economies research agenda: the performative nature of research for alternatives, thick description/weak theory, a more-than-human perspective and post-capitalist perspective (Gibson-Graham 2008; Roelvink et al. 2015). In turn, the Diverse/Community Economies research community could benefit from the comprehension of the diffusion patterns taken by grassroots innovation and the role played by intermediary actors and resources (Seyfang and Longhurst 2015; Boyer 2015). In addition, hands-on contributions around the Sharing Cities narrative (McLaren and Agyeman 2015; Shareable 2018) may be considered as a popular narrative that may facilitate the translation of the commoning approach in a *lingua franca* more palatable to urban stakeholders.

6. A logical further step in studying commoning as an emerging, transformative and urban phenomenon is to address the question of building the political

coalitions which are required if commoning is to be institutionalized locally as called for by legal scholars (Foster and Iaione 2015). In this regard, Bauwens & Niaros (2017) are likely the foremost example in exploring this vertical dimension of commoning reporting on cases of city councils aligned with the proliferation of commons and greater participation of citizens in city making. In this regard, further attention ought to be paid to the existing development of a municipalist movement (Rubio-Peyo 2017) that gives increasing importance to the commons. With its focus on reclaiming the space and government of the city (Bianchi forthcoming), the municipalist idea may provide productive avenues with which to think of the commoning of the city in political and institutional terms.

7. As I noted towards the end of my last article (Labaeye, submitted), reframing commoning as a more-than-human and relational phenomenon proves instrumental in accompanying the (re)emergence of a worldview based on interdependence seen as critical for survival in the face of climate change or the sixth mass extinction (Scharmer and Kaufer 2013; Klein 2014; Giorgino and Walsh 2018). It provides a fresh analytical lens fit for the Anthropocene with which to re-read urban practices emancipated from a capitalocentric and naturalist worldview and rooted in a non-dualist ontology. Walsh (2017) argues that material transformations necessarily go hand in hand with transformations of consciousness. He shows that commoning involves material and social-spiritual exchange between individuals and communities who, by self-organizing, take responsibility for each other (Walsh 2017). Similarly, Doran (2017) describes the surge of self-care and mindfulness practices as the self-organization of commoning spaces carved out of an attention economy that is set to extract our inner self as a resource. Pioneered by Walsh and Giorgino (2018), radical approaches of transformation such as post-capitalist commoning are entering into dialogue with contemplative social sciences in order to better understand how material transformations and transformations of consciousness may work hand in hand to answer the many challenges of the Anthropocene. This may find good precedent in the diverse economies community. Thus, Roelvink et al. (2015) mention previous work (Gibson-Graham 2006a; Byrne and Healy 2006; Madra and Özselçuk 2010) that explored the way in which therapeutic processes work on the conscious and the unconscious mind to shape new practices of the self and how these processes might operate within groups building community economies. I suggested that cities act as hubs for the diffusion and remixing of

contemplative practices as well as a locus of innovations for sharing practices, and, eventually, are a field of election to identify commoning-communities that bring the inner and outer transformations together.

8. Finally, I have identified in my personal surroundings various concrete cases to be researched as commoning-communities that may illustrate many of the points outlined above. A quick look at these cases may give a concrete illustration of what (urban) commoning-communities are. Firstly, my own preliminary research results – which I eliminated from the scope of this doctoral research because of the lack of empirical evidence for the role of digital tools – show indication that the more-than-human commoning-community of urban foraging involves shifts in the consciousness of foragers in relation to their more-than-human surroundings. Secondly, I personally got involved in the fermentation community and, both from experience and practitioners' accounts (Katz 2012), taking up the commoning of cultures of bacteria and fungi does provoke noticeable changes in the everyday perception of our more-than-human food system. The dramatic explosion of such practices among urban dwellers may justify further research to uncover the unseen, and more transformative, part of the iceberg of an economy that only recently emerged through a trending market of fermented foods, books, fermenting cultures and courses. Thirdly, through collaboration with the project OpenSourceSeeds that has developed an open-source license for preserving new plant varieties as commons, I am co-developing a commoning-community around the idea of an open-source bread. Under this initiative we are bringing the whole chain of bread production from the seed breeder and farmer to the baker and miller as well as customer to perform a commoning-community where the role of the plants (wheat) and of legal apparatus (open-source license) are acknowledged. Such a community performatively bridges the *urban* and *rural* re-embedding food production in its socio-ecological matrix. Fourthly, the Freifunk community in Germany is composed of over 400 local groups that organize tens of thousands of individual points of free access to the internet. This commoning-community emphasizes the role played by community organizing and Free and Open Source Software for commoning internet access through the distributed use of private routers: a case that illustrate the postcapitalist approach of focusing commoning beyond a discussion of ownership and enclosure.

4 Conclusion

At the outset of this research I identified three research objectives. Firstly, I wanted to investigate the practice of collaborative mapping to identify avenues for the research of sustainable alternative economies to engage with and benefit from digital commons emerging from the grassroots. Secondly, I aimed at bringing light to and unpacking the intertwin of urban and digital commons in initiatives situated at the intersection of the urban and digital spaces. A third objective was to investigate the commons as a transformative narrative of change for just and sustainable cities.

Results have shown that digital and urban commons may be two faces of the same urban commoning process or practice and compels researchers to abandon the IAD framework in researching urban commoning. The central result of this research is to reframe urban commons and digital commons into (urban) commoning. This enables the observer to move away from a static and naturalist conception of the commons. Moving away from an initial understanding that revolves around the reclaiming or creation of shared urban resources, I redefine urban commoning as a relational practice of building more-than-human partnerships for the reproduction of life in the city. Rather surprisingly, I also provided an empirical basis to show that commoning the city is not predominantly attached to digital tools, although these may open up new opportunities. While there is no conclusive evidence that commoning would have a deep, transformative impact on major urban sub-systems, the concept opens theoretical avenues for accompanying the transformation of the local state towards a facilitating role of citizen participation in city making. In addition, I have provided indications that commoning practices diffuse through replication, offering potential to contribute trans-locally to sustainability transitions. Finally, I have provided an overview of the landscape of collaborative mappings for alternative economies and outlined an approach – knowledge commoning – for researchers to engage in these efforts alongside citizens.

This doctoral research involved various research methods. The first article reported on action research that included online co-production of a large inventory of collaborative mappings of alternative economies. The use of an online wiki is a good example of how open source collaborative infrastructure can support knowledge production at the intersection of research and activism. It also included collecting materials through semi-structured interviews and review

of secondary materials, the latter being facilitated by the great amount of online documentation involved in initiatives that largely unfold in the digital space. The rather conventional case-study approach of the second article benefited from such availability of primary and secondary material. Interviews in New York were conducted through video calls, avoiding almost one Ton of carbon emissions: indeed, how can sustainability researchers remain credible if they keep flying to interesting fields and conferences (Attari et al. 2016)? Eventually, results presented in the third article relied on a systematic review of secondary case-studies. This broad set of methods in collecting research materials broadens the knowledge base for my results.

I outlined a research program for researching urban and more-than-human commoning-communities as a contribution to the Diverse/Community Economies research agenda. Here is an overview of this outlook:

1. Following feminist scholarship, this would benefit from being approached through a relational epistemology.
2. Methodologically, thick description and a weak form of theory are encouraged to allow new facts to emerge.
3. Engaging with grassroots collaborative mapping of alternative economies could facilitate the identification and performation of those commoning-communities and also bring back wider interest to a typically geographical technique – i.e. cartography.
4. Collaboration with citizens would benefit from being actively conceptualized as knowledge commoning, raising critical questions of how shared knowledge is (re)produced, distributed and accessed. As such it may offer an entry point for operationalizing a citizen science true to its original premises.
5. I see the study of urban commoning-communities as an opportunity to bridge the Diverse/Community Economies and the Grassroots Innovations/Transformative Social Innovation research agendas, enriching each other of their specific contributions, ultimately carrying more weight in the academic debate over urban sustainability transitions.
6. Researchers of urban commoning should devote more attention to the issue of institutionalization of commoning practices and the necessary political movements/coalitions required for this. A bridge to the study of the municipalist movement could offer avenues for thinking the trans-local and political up-scaling of commoning.
7. Commoning needs to be simultaneously approached as a material transformation and a transformation of consciousness. Cities are a privileged terrain for identifying more-than-human commoning-

communities that involve a transformation of consciousness towards non-dualist worldviews.

8. Finally, I suggest investigating four more-than-human commoning-communities that I have identified in Germany as an illustration of the type of partnerships that we may consider researching in order to operationalize the above research program. These communities are linked to the practices of urban foraging, fermenting cultures, open-source bread fabrication, and providing distributed internet access.

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6 Articles

This cumulative doctoral dissertation is constituted of three peer-reviewed articles as follows:

1. Submitted in 2016: Labaeye, Adrien (2017): Collaboratively Mapping Alternative Economies. Co-producing Transformative Knowledge. In *NETCOM* 31 (1-2), 99-128. DOI: 10.4000/netcom.2647.
2. Submitted in 2017: Labaeye, Adrien; Mieg, Harald (2018): Commoning the city, from digital data to physical space. Evidence from two case studies. In *Journal of Peer Production* (11: CITY). Available online at http://peerproduction.net/issues/issue-11-city/peer-reviewed-papers/commoning-the-city-from-digital-data-to-physical-space/, checked on 3/11/2018.
3. Submitted in June 2019: Labaeye, Adrien (in review): Sharing Cities and Commoning: An Alternative Narrative for Just and Sustainable Cities. In *Sustainability*.

As two of the journals (*NETCOM* and *Journal of Peer Production*) were not listed in the VGDH nor ISI nor SCOPUS, the Institutsrat of the Institute of Geography approved the selection of journals in its meeting of 24 October 2017. The peer-reviewed journal *Sustainability* is included in SCOPUS[4].

4 , accessed 4/07/2019.

6.1 Article 1

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COLLABORATIVELY MAPPING ALTERNATIVE ECONOMIES: CO-PRODUCING TRANSFORMATIVE KNOWLEDGE

LABAEYE ADRIEN[5]

Abstract *- The goal of this article is to inform practitioners and researchers alike about the emerging practice of collaboratively mapping alternative economies. The paper draws from an inventory of over 200 maps, action research, and semi-structured interviews to explore how collaborative mapping – a practice that is largely citizen-driven – may be leveraged for the co-production of (scientific) knowledge about alternative economies. An array of real and ideal types is proposed in order to help navigate the various dimensions of collaborative mapping. Four lines of discussion are proposed: (1) what can we learn from maps when reframed as mappings – as processes? (2) How performativity may bring light to evaluating the transformational nature of knowledge derived from collaborative? (3) How does collaborative mapping offer avenues for rethinking empowerment of citizens in producing knowledge about alternative economies? And, (4) what new challenges are emerging from acknowledging digital knowledge as a commons?*

Keywords *- Alternative economies, Co-production, Action research, Knowledge commons, Digital mapping.*

LA CARTOGRAPHIE COLLABORATIVE DES ECONOMIES ALTERNATIVES: CO-PRODUIRE UNE CONNAISSANCE TRANSFORMATIVE

Résumé *- Le but de cet article est d'informer autant les personnes de terrain que les chercheurs à propos de la cartographie collaborative appliquée dans le champ des économies alternatives. Cette étude est basée sur un inventaire de plus de 200 cartes, une recherche-action de deux ans, ainsi que des entretiens semi-directifs afin d'explorer dans quelle mesure la cartographie collaborative – une pratique largement à l'initiative des citoyens – peut être mise à profit de la co-production d'une connaissance des économies alternatives. Un éventail d'idéaux-types et de types réels est proposé afin de s'orienter à travers les diverses dimensions de la cartographie collaborative. Quatre axes de discussion sont explorés : (1) que peut-on apprendre de ces cartes lorsqu'elles sont comprise comme processus de cartographies ? (2) comment le concept de performativité permet de mieux comprendre la nature transformatrice de connaissances dérivées de cartographies collaboratives ; (3) dans quelle mesure la cartographie collaborative offre des pistes de réflexion afin de repenser la question de l'agence des citoyens dans la production de*

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connaissances au sujet des économies alternatives ; et, enfin, (4) quels nouveaux défis découlent d'une reconceptualisation de la connaissance comme un commun ?

Mots-clés *- Economies alternatives, Co-production, Recherche-action, Communs de la connaissance, Cartographie collaborative.*

INTRODUCTION

Many maps show the mushrooming of grassroots and bottom-up experiments with social and ecological goals. In parallel to mapping, a variety of research fields and concepts are emerging to describe this new reality: social innovation (Mulgan, Tucker, Ali and Sanders, 2007), grassroots innovation (Seyfang and Smith, 2007), third sector (Evers and Laville, 2004), degrowth (Schneider, Kallis and Martinez-Alier, 2010), commons-based peer production (Benkler, 2006) and commons (Bollier and Helfrich, 2012). This diversity on the ground can be described as alternative economies, i.e. processes of production, exchange, labor/compensation, finance, and consumption that are intentionally different from mainstream (capitalist) economic activity (Healy, 2009, p. 338).

In the online practice networks and communities that form around alternative economies, digital mapping is common feature. Mapping is used in a variety of ways; to display the geographic breadth of a network, to provide location-based networking resources; and sometimes to make an alternative practice possible (e.g. harvesting fruits) or catalyze local communities around an emergent theme (e.g. sharing economy). The increasing availability of open cartographic data with the establishment of OpenStreetMap on the one hand, and, of open source mapping software and user-ready applications, on the other hand, have made digital mapping very accessible and increasingly collaborative. Thus, Borowiak (2015) shows that mapping is used by the Social and Solidarity Economy networks to make their communities more visible. Beyond this pioneer work, the practice of online and collaborative mapping remains largely overlooked by academia in the context of alternative economies. While a geography of sustainability transitions emerges (Hansen and Coenen, 2015), this cross fertilization of transition theory and economic geography still largely overlooks alternative economies (Schulz and Bailey, 2014). Only very recent research has investigated their spatial diffusion arguing that it is a key step in order to formulate arguments about the emergence and development of alternative economies in different places (Feola and Butt, 2015). Thus, in their spatial analysis of the Transition Town Network and Solidarity Purchasing Groups, Feola and Butt (2015) relied on data available on the website of the related networks. Beyond that example, very few researchers have seized the opportunity of using such maps as data source, and, even less, to acknowledge them as sources of knowledge in their own right. As a result, academic knowledge on the alternative economies and the co-production of knowledge remains underdeveloped. This article attempts to fill that void.

The Transformap collective, formed in 2014 by activists, mappers, and researchers, in which I participated, identified over 200 maps of alternative economies. What do those maps look like? What information do they provide? How are they produced? Who is producing them? What is the role of digital equipment or particular online collaborative technology in these projects? I answer these questions by presenting stylized results of the Transformap inventory, informed by documentary research, situational knowledge, and interviews with map makers. This description of an emerging phenomenon –

collaborative mapping – may provide answers to practitioners and scientists who wonder how collaborative mapping may be leveraged for the co-production of knowledge about alternative economies. I proceed to discuss these findings within an interdisciplinary context drawing from sustainability science, sustainability transitions, and economic geography, as well as studies of citizens science that investigates how digital equipment transforms the way we produce knowledge. Four lines of discussion are explored: (1) what can we learn from maps when reframed as mappings? (2) How does the concept of performativity bring light to evaluating the transformational nature of knowledge derived from mappings? (3) How does collaborative mapping offer avenues for rethinking citizen empowerment in producing knowledge about alternative economies? And, (4) what new challenges are emerging from acknowledging digital knowledge as a commons?

1. MATERIALS AND METHODS

1.1. Materials

This article builds upon action research started in March 2014 when I joined a call by commons activist Silke Helfrich to make a map of all alternative economies[6]. We formed a collective later called Transformap with the mission[7] to facilitate the networking – both technically and socially – of existing mappings of alternative economies (solidarity economy, [urban] commons, degrowth, social and grassroots innovation, etc.). During this process of collaborative knowledge production I was one of a handful of participants who collected and sorted existing mapping initiatives. The result was an atlas of 218 examples of working maps (as of August 18th 2016) that reflect various facets of alternative economies[8].

Beginning with an online spreadsheet, this collection of maps later took the form of an online wiki with semantic capabilities allowing for an open-ended and self-ordering process. Criteria for collection were any mapping (ongoing or envisioned) that is related to the broad container of alternative economies, including social/grassroots innovation promoting fair and sustainable models, but also maps of social movements (e.g. Environmental Justice) and urban protest (e.g. WIRBLEIBENALLE). This inventory has been open and inclusive, and uses tags to sort selected initiatives.

During the course of 2015, ten semi-directed interviews with key participants (mostly map administrators) from grassroots mapping initiatives located in France, Germany and the USA were conducted with the objective of opening the black box of map making and maintenance to better understand the motivations and challenges of collaborative mapping. Four short reports were published on a blog[9] to share the findings with the Transformap community at large, discussing in particular the complexity that underlies the idea of aggregating different mappings – one of the original and central idea of Transformap. These reports informed a continuous conversation on the community forum[10] where a number of mapper activists from across the world discuss various aspects of mapping alternatives and contribute to an informal and loose process of information sharing. This online conversation was punctuated by several face-to-face meetings where participants attempted to

6 See blog post at . Last accessed on 11/05/2016.
7 Mission statement . Last accessed on 11/05/2016.
8 , accessed on 18/08/2016.
9 , , , ; accessed on 04/10/2016.
10

align their vision and outline a socio-technical architecture for aggregating and interconnecting mappings of alternative economies. The results presented in this paper are an attempt to formalize the situational knowledge I derived from my participation in this two and a half years conversation.

1.2. Methods

My participation involved strategic development, grant writing, networking with potential partners, community development, facilitating community mapping experiments, and producing research briefs. These various modalities of action, while sometimes hard to isolate from one another, resonate strongly with existing literature that has outlined ideal types of roles that action researchers can adopt while taking part in local sustainability transitions processes (Wittmayer and Schäpke, 2014). Action research is seen by the diverse economies research agenda as a key method for researchers to support the enactment of marginalized economic forms and the documentation of economic diversity (Gibson-Graham and Roelvink, 2011). By taking part in a collective that aimed at bringing together existing maps of alternative economies to increase their visibility, my action research is clearly set within the framework of a performative ontological research agenda (Gibson-Graham, 2008) – an endeavor that through its description acts the existence of an alternative reality. In this paper, I take the role of the reflective scientist, displaying and analyzing the results of our inventory and atlas – as a performative action for bringing more visibility to alternative economies, and elaborating on the practice of collaborative mapping as one technique for uncovering economic diversity.

A combination of real types and ideal types is proposed. They were designed by outlining criteria that emerged during two years of action research. These types are *not* rooted in statistical analysis; they are explorative stylized facts that may require further statistical validation and are designed to help the reader to approach the practice of collaborative mapping. They serve as a concrete basis for the discussion that ensues. The three-pronged approach proposed – products, processes, producers – derives from informal exchanges with map practitioners on the best way to describe the rich practice of collaborative mapping. It reflects the fact that research interest in the field of cartography has shifted form the map as *object* to mapping as a *practice* (Crampton, 2009). It is also influenced by the commons literature and its recurring tendency to distinguish three analytical levels: the resource (the commons), the rules to govern its use (the commoning practice), and the community/users (the commoners) (Urban Research Group, 2015).

Real types of products (i.e. specific maps) displaying a typical combination of criteria were picked up and tested against the rest of Transformap's inventory of maps to ensure they were representative of the sample. Three representative real-types are extensively presented, while others, more marginal, are briefly introduced. Ideal-types of processes and producers are based on the stylistic exaggeration of one characteristic feature to stress the most common elements encountered in our collective exploration of collaborative mapping.

2. LITERATURE REVIEW

2.1. Mapping and performativity

A central concern of this paper is the transformative character of knowledge. To approach this point, it is of value to also understand the concept

of alternative economies as “an alternative representation of economy as a heterogeneous and proliferative social space” (Healy, 2009, p. 338). This perspective seeks to deconstruct a binary view of the economy where the capitalist economy is the dominant form of economic life and non-capitalism is nothing more than idealistic, inferior or powerless (Gibson-Graham and Roelvink, 2011). By displacing this binary view of the economy and shifting to one of many capitalist and non-capitalist forms, we open up many more spaces of action without prejudging their transformative potential (Gibson-Graham and Roelvink, 2011). Gibson-Graham argues that the study of alternative economies itself is “a performative ontological project – part of bringing new economies into being – rather than a realist epistemological project of capturing and assessing existing objects" (Gibson-Graham, 2008, p. 616). Therefore, through the research process knowledge may be transformative. At an operational level, Gibson-Graham (2008) asks the question of what tools and technologies are available to perform new economies. In spite of being rooted within the field of (economic) geography, it is only recently with Borowiak’s work on Social and Solidarity Economy (2015) or earlier on with Pavlovskaya’s study of multiple economies of households in Moscow (2004) that the literature on alternative economies has started considering mapping and mapping technologies.

This is not accidental. Indeed, while GIS and mapping technologies is now widespread the use of maps by geographers is in constant to relative decline as has been largely described by the literature as argued by Herb et al. (2009) and Wheeler (2013). Indeed, following Harley and his postmodern critique of maps as representations of power – heavily tainted by their history of being used as means of domination – rather than objective forms of knowledge (Harley, 1989), maps are being cautiously approached in geography. However, and while they acknowledge the critique, Dodge and Perkins (2008) call geographers to reclaim the map, arguing that it is “one of [geography’s] few `unique selling points'” and that “maps are visual, immensely appealing, and can be rhetorically powerful” (Dodge and Perkins, 2008, p. 1273).

A major evolution in the interest for cartography is the shift from the map as an object (a representation) to mapping as a practice (Crampton, 2009). Thus, Kitchin and Dodge (2007) argued that maps are transitory, they are always *mappings*, and cartography is a processual, rather than representational, science. Similarly, Herb et al. (2009) argue that the focus of (political) geographers should be on the material practices behind the construction and use of maps. This shift towards mapping as a practice is accompanied by an increasing interest for performativity. Thus, for Crampton (2009) mapping is performative, participatory and political; which is illustrated by the development of amateur mapping from arts to political protest. While addressing the difficulty of handling multiple ontologies around the particular case of indigenous knowledge, Turnbull (2007) also reframes mapping as performative action and encourages us to look at the tension and cooperation produced by the encounter of diverging mapping approaches. From this point on, maps [of alternative economies] may be reframed as mappings which value primarily resides in their performative nature.

2.2. The ethical and political of knowledge co-production

Gibson-Graham (2008) argues that the performativity of research means that researchers also have a responsibility in carefully choosing the object of their research, and have the opportunity to enact and support economic diversity by intentionally studying marginal, hidden or emergent forms of economic life. This call for researchers to unearth unknown practices resonates in more recent pleas for a solutions-based research agenda in sustainability

science (Miller et al., 2014). Such approaches are evidently not neutral in their political and social motivations, but inevitable because of the political nature of knowledge systems dealing with global change: scientists should recognize and accept their social responsibility (Cornell et al., 2013, p. 67) and become citizen scientists (Haklay, 2013). Importantly, there is growing consensus that identifying solutions involves collaborations between academics and communities who are pursuing social and ecological well-being (Miller et al., 2014). Further, researchers should engage in the societal arenas in which sustainability problems are being tackled requiring a radical change in the way knowledge systems are structured (Cornell et al., 2013). In particular, Cornell et al. (2013) consider that sustainability scientists should collaborate openly in knowledge co-production and its translation to other actors in knowledge systems. This is echoed by Wiek et al. (2012) who suggest that advanced collaborative research settings and advances in transformational research methodologies are key directions for further developing a solutions-oriented research agenda.

Transdisciplinary research, action research and citizen science are probably the three traditions that have most contributed to collaboration and experimentation with non-academic actors in co-producing novel knowledge for sustainability (Lang et al., 2012; Wittmayer and Schäpke, 2014). Action research, in particular, is an approach to science that aims at ‘‘the transformation of power relationships in the direction of greater democracy’’ (Greenwood and Levin, 2007, p. 73). Hence, departing from a more traditional descriptive-analytical role, the action researcher has to deal with ethical and political challenges while facilitating real experiments (Wittmayer and Schäpke, 2014). Brandt et al. (2013) show that in spite of various levels of practitioners’ engagement, empowerment is in fact rarely realized in transdisciplinary research projects. A similar trend has been observed in the field of citizen science, with citizens often enjoying low to no agency in the process of knowledge co-production (Nascimento, Guimarães Pereira and Ghezzi, 2014). These findings are in tension with the original definition of citizen science as “a science, which assists the needs and concerns of citizens (…) [implying at the same time] a form of science developed and enacted by citizens themselves” (Irwin, 1995, ix). To highlight that dimension of power relationships in citizen science projects Haklay (2013) propose a spectrum of participation where, in its highest tier – ‘extreme citizen science’ – citizens and scientists may actually stand on equal footing, challenging the elitist conception of science where the transfer of knowledge is one directional, from the scientist to the citizen. This approach requires a new epistemological understanding of the process of scientific knowledge production. Acknowledging this new reality in their review of numerous citizen-driven practices, Nascimento et al. (2014) concur that citizen engagement “requires to accommodate practices and spaces that engage citizens in the questions that need to be investigated in order to resolve societal challenges, as well as make space for different epistemologies and ontologies with regards to knowledge production, assessment and governance." (Nascimento et al., 2014, p. 49)

I will discuss the hypothesis that collaborative mapping is such a practice, empowering citizens (activists more precisely) to deploy and perform alternative ontologies of economic processes and interactions, and may require a new epistemological understanding.

2.3. The digital transformation of knowledge

The advent of the web 2.0, and of user-generated content in particular, gave a considerable new boost to the concept of citizen science especially in

fields where data collection and/or processing are resource and time-consuming such as geography, ecology and biodiversity, natural history, biology, astronomy, genetics, epidemiology, history and archeology, etc. (Nascimento et al., 2014). In the field of cartography and Geographic Information Systems (GIS), the emergence of user-generated content gave birth to the phenomenon of Volunteered Geographic Information (VGI) (Goodchild, 2007). With VGI, information is produced by a large number of volunteer contributors and citizens function as *sensors* – in a rupture with traditionally hierarchic and professional geographic agencies. The same logics that support the existence of Wikipedia also support OpenStreetMap, the largest volunteered world map. Interestingly, Goodchild, in his landmark article *Citizens as sensors*, remarked that "the most important value of VGI may lie in what it can tell us about local activities in various geographic locations that go unnoticed by the world's media, and about life at a local level" (Goodchild, 2007, pp. 220–221). However, framing the role of citizens only as *sensors* may transpire a general attitude towards volunteers seen as agency-less chunks and bits of data in an indistinct *crowd*. In stark contrast, Nascimento et al. (2014) describe an emerging "do-it-yourself (DIY) science'" in which numerous private and community-based initiatives use scientific methods alongside other forms of enquiry such as hacking and remixing to engage with techno-scientific concerns and societal challenges. As a bottom-up phenomenon, DIY science, they contend, embodies a citizen science as it was originally envisioned by Irwin (1995).

The combination of higher average levels of education, the availability of digital communication technologies and open access information is opening up the process of knowledge production (Haklay, 2013; Shirky, 2009). Neverthelss, (sustainability) science still needs to consider how Information Communication Technology (ICT) transforms the production, diffusion and use of knowledge in responding to societal problems (Cornell et al. 2013). Further, it may benefit from acknowledging the influence of the Internet as "a device of complexity" that shapes the meanings people assign to the world (Paradiso, 2011, p. 52). In fact, what sustainability scholars and many economic geographers still largely overlook is increasingly being addressed in other disciplines around the concept of commons:

> *"One of the critical factors of digital knowledge is the 'hyperchange' of technologies and social networks that affects every aspect of how knowledge is managed and governed, including how it is generated, stored, and preserved" (Hess and Ostrom, 2007, p. 9).*

Hess and Ostrom (2007), argued that digital technologies redefine knowledge as a commons, meaning, as a resource shared by a group of people that is vulnerable to social dilemmas (Hess and Ostrom, 2007, p. 3).

Understanding knowledge as a commons offers a new lens for considering the question of ownership in the process of knowledge production and its outcomes. Especially considering the role of digital technology and the way it affects collective action. In that regard, the study of online collaborative mapping cannot ignore the major role played by free licenses – allowing anyone to copy, modify, and distribute a piece of information – in enabling the collaboration needed for the development of digital commons such as open source software (Schweik and English, 2012). Less obvious and rarely addressed, online collaboration and the co-production of commons also needs shared communication infrastructure (Fuster Morell, 2014). Often such collaboration infrastructure is provided by mega-projects like Google (Paradiso,

2011) and other commercial entities such as in the case of open source software (Schweik and English, 2013), or photo sharing (Fuster Morell, 2014). However, the collaboration infrastructure itself can also be provided as a commons such as in the case of Wikipedia or OpenStreetMaps (Frischmann, 2012; Fuster Morell, 2014). As for Fuster Morell (2014), infrastructure is not neutral for collective action: it shapes the community and the resource and raises the question of how far (or whether) the two can be detached from one another as it is usually assumed by the commons literature[11].

This leads to the formulation of the hypothesis that licenses and infrastructure provision do play a central role in defining how mappings of alternative economies unfold.

11 See the use of the Institutional Analysis and Development framework as in Ostrom (1990), Hess and Ostrom (2007), or Schweik (2013).

3. RESULTS

3.1. Atlas overview

Geographic coverage	Count of maps	Geographic coverage	Count of maps
World	**30**	**Sub-national region**	**7**
Continental region	**11**	Texas	2
Europe	8	Bretagne	1
Americas	3	…	
Country	**116**	**City**	**50**
Germany	24	Berlin	11
France	16	Hamburg	3
USA	16	Athens	2
United Kingdom	14	Barcelona	2
Austria	12	…	
…		**Neighbourhood**	**2**
TOTAL	**216**		

***Table 1**: Counts of maps for various geographical coverages.*

As a preliminary remark, it is worthwhile to note that the data collection is clearly biased towards maps covering Germany (26), France (16), USA (16), UK (14), Austria (12) and the city of Berlin (11) due to the localization of most of the (citizen) researchers and their languages skills (German, English, French, Spanish).

In its census the Transformap collective systematically indicated the geographical coverage of the map. Taken together, country and city-wide maps represent three-quarter of the sample. It is of interest to observe that maps are easily scalable to the country level: indeed, once set up, digital mapping tools do not limit geographically the expansion of the map. Language, however, is a key constraint in defining the geographic spread of a map. That said, city-level maps are not necessarily a first step towards a country-level map. Often the motivation of the actors behind such cartography is to use mapping as a catalyst for assembling a local community.

Label	Count
Geographical scale	
	4
	4
	3
Contested and normative concepts	
	13
	12
	10
	10
	9
	4
	4
…	

Generic themes	
	15
	9
	8
	6
	5
	5
	4
	4
	4
	4
	4
…	
Identified practices	
	18
	10
	8
	6
	5
	4
	4
	4
…	

***Table 2**: Thematic coverage around four broad clusters.*

In order to gain a better understanding of what the maps inventoried in the atlas are about, their thematic coverage is presented in Table 2. To ease the navigation of those tags, four clusters have been arbitrarily delineated for this paper: generic themes (e.g. Food, Education, Land, etc.), normative and contested concepts (e.g. Sharing, Commons, etc.), identified practices (e.g. Community gardening, Urban foraging, CSAs, etc.), and geographic scales (Local, Neighborhood, etc.). It seems not valuable to draw further conclusions from the analysis of thematic coverage due to the fact that the collection of data and its tagging happened in an organic way, not following strict scientific methods. Nevertheless it may give a good indication of what subjects are covered by these maps.

3.2. Real types of map products

In order to navigate the diversity of maps, three real types are proposed: these cases have been selected for one or two key characteristics that clearly distinguish different map types. Those three real types cover 73% of the atlas entries. The remaining are more marginal types or cases briefly presented in a fourth subsection. Using real types instead of ideal types allows the presentation of existing maps making it more concrete for the observer.

3.2.1. The map directory: Map of urban gardens in Germany

Gärten im Überblick[12] is a map of over 560 urban gardens across Germany. It provides addresses, contact details, and a description for each initiative. It is maintained by the non-profit association *Anstiftung und Ertomis* that collects data and keeps it up to date to facilitate a large gardening network. It distinguishes between three types of gardens: those in project, community gardens, and intercultural gardens. The map is known as a key

12 , accessed 05/08/2016.

networking resource among people involved in urban gardening. Data is strongly curated (no crowd-sourcing as such) and exclusively focused on one well-identified practice: urban gardening.

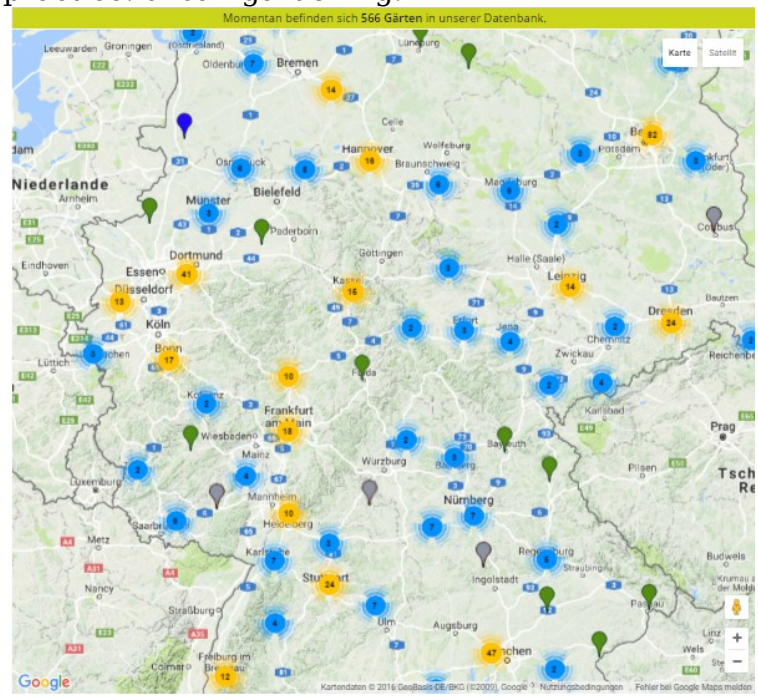

Figure 1*: Screenshot of Gärten im Überblick, the German map of urban gardens.*

This real type is characterized by the fact that it is a list of initiatives belonging to one clearly defined practice or network. In these directories, inclusion of additional entries is straightforward and usually controlled for compliance by one or more administrators against a clear-cut criterion: e.g. be an urban garden, or, be a member of Transition Network[13]. With 78 occurrences (36%), such map directories are the most common type encountered in our atlas. They focus mostly on a national scale or larger territories. Mappers and communities of practice explain the popularity of such maps because they improve the visibility of a practice, demonstrate the geographical scope of a network, and also support indirect networking among initiatives. Such directories sometimes do not even involve a map, but are strictly similar in the constant effort of data curation they require.

As a directory the map value comes from it being up to date: those maps are really mappings – processual endeavors. While data is generally closely curated by administrators, in some seldom cases, like the list of hackerspaces[14], data is completely crowdsourced thanks to a mediawiki[15]. In such cases, curation – i.e. the selection, preservation, maintenance, collection and archiving of data – is done by the community of wiki contributors including administrators with higher editing rights. It is notable that the *map directory* includes generally few categories as it focuses on one single practice or one defined network of initiatives, and therefore covers a homogeneous population.

3.2.2. The map with loose boundaries: Leipzig im Wandel

Leipzig im Wandel is a local mapping of over 40 initiatives that are presented along 9 main categories constituent of a sustainability transition. It is

13 , accessed 05/08/2016.
14 , accessed 05/08/2016.
15 A mediawiki, in that case a semantic mediawiki, is a specific open source software enabling wiki such as Wikipedia.

designed to substantiate and promote the moving concept of *transition* (*Wandel* in German) in the German city, but also, by presenting initiatives together, increase networking among very diverse initiatives. The mapping is a project of two local organizations: Local Agenda 21 Leipzig and Transition Town Leipzig. Local initiatives are encouraged to create an online profile to submit their information to the map. The only purely objective criterion a new entry has to fulfil is to be located in the city; whether it contributes to sustainable development is left to the appreciation of the map administrator.

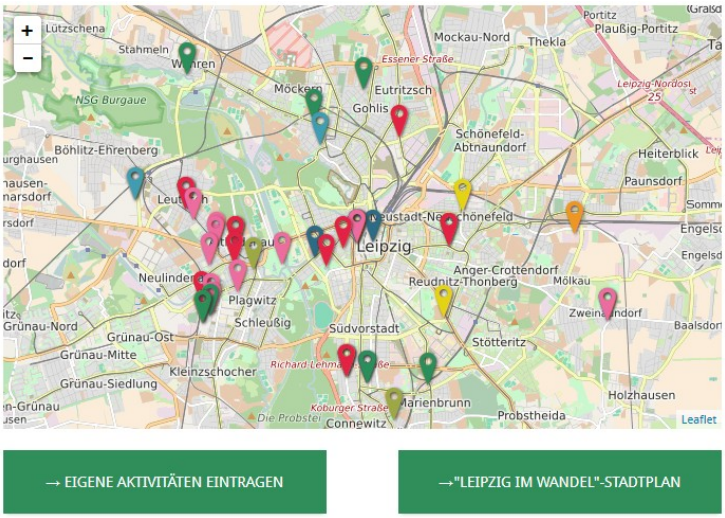

Figure 2*: Screenshot of the 'Leipzig in transition' map (attribution to OpenStreetMap is missing).*

This real type is characterized by a map list of initiatives that are described by an overarching concept from which clear cut criteria cannot be (or are not) derived to determine what belongs on the map. The map type has loose boundaries and inclusion varies from either completely open or an arbitrary decision from a map administrator. This real type is found 45 times (21%) in the atlas. These maps, in contrast with the *directory* real type, generally display an aggregate of diverse objects, with the aim of substantiating a moving or normative concept (e.g. transition, commons, or collaborative economy) across a given geographic area. These maps are utilized by individuals and organizations that are attempting to make various practices or networks converge by developing a collective identity.

For other mapping that fall under this real type, collection and maintenance of data is generally up to the crowd who can add new points or edit existing ones, the level of control by the map provider varies a lot. Some mappings like Karte Von Morgen[16] or Imagination.social[17] let anyone add a new entry when others like the Colibris[18] movement curate the edits made by the crowd, and others such as I-Share[19] require creating an account and logging in. Others, like the map of Tokyo New Urban Commons[20] do not provide any opportunity for participation. Generally, the crowd is not involved in the process of developing categories to order the initiatives, this is done by the publishers of the map. Nevertheless, the example of Collporterre's map[21] of collaborative consumption in the Bretagne region in France shows that this framing process

16 , accessed 05/08/2016.
17 , accessed 05/08/2016.
18 , accessed 05/08/2016.
19 , accessed 05/08/2016.
20 , accessed 05/08/2016.
21 , accessed 05/08/2016.

may take the form of several workshops engaging stakeholders. In that case the mapping process was initiated and designed as an action research study, and the resulting map is a research outcome. Map jams are another way to kick start a mapping process in a participative fashion (see ideal type of digitally-mediated participatory mapping). The I-Share research mapping allowed initiatives to add the keywords (tags) they found suitable in addition to pre-determined categories. Such open-ended tagging approach allows the emergence of vocabularies from the bottom-up.

3.2.3. Maps of urban assets: 596 Acres in New York City

***Figure 3**: Screenshot of the Living Lots map produced by 596 Acres in NYC, USA.*

Beginning in 2010, 596 Acres[22] developed an accurate map of public vacant land lots in New York City (extensively) drawing upon public open data. Through the intensive work of checking, updating, and translating this rough data into actionable information that is brought to the physical locations, combined with active community organizing, the initiative has managed to spark a local movement of people who have reclaimed over 30 (at the time of writing) vacant land lots for community purposes such as community gardening. 596 Acres shows that translating crude data into actionable information and bringing it into the physical space can bridge digital divide, and turn (open) data into a strategic and civic resource for the renegotiation of public urban space; in some instances, actually promoting commoning practices of those resources (i.e. community gardening of land). This initiative has been replicated in other locations such as Philadelphia, Melbourne and Montreal[23].

The characteristic of this real type lies in the fact that it maps assets, vacant lots, in contrast with the two other types of mapping where points of interest consist of initiatives, organizations and the like. 16% (34 occurrences) of the sample falls under this category. Similar initiatives have used open or crowdsourced data to map public resources such as fruit trees. In its wiki, Transformap indexed 18 of those under the “Urban foraging” tag[24]. This type of map is not about representing a community or showcasing a practice, but a participative instrument for a bottom-up reconfiguration of public assets such as vacant land or edible trees. In other words, those mapping initiatives are strategic instruments in the development of commons-based alternative economies (further article in preparation).

22 , accessed 05/08/2016.
23 , accessed 05/08/2016.
24 , accessed on 20/09/2016.

3.2.4. Further marginal types

Other types were identified but were deemed marginal in the sample or with little value within the frame of this paper. Nevertheless, it may serve to mention some of them. 10 maps display a similar characteristic: they serve as an interface to connect individual users to each other. These are typically used for sharing items (e.g. a drilling machine, a costume…) and are well known in the field of the sharing economy; many for-profit sharing economy platforms also use maps or some form of geo-location for matching their users. Other maps in the Transformap atlas are displaying data (e.g. climate) with particular relevance to sustainability or alternative economies. Another noticeable mapping initiative is ESS Global: an effort to develop guidelines for the solidarity economy communities to streamline the way they produces maps across the world[25]. Their goal is to allow interoperability – instead of centralization – and shared visualizations, towards linked open data. Researchers are involved. This endeavor to use the potential of linked open data is also integrated into the location-based civic participation platform Communecter that enables citizens to register any kind of initiatives they deem relevant[26]. All data is licensed under an open license to encourage cross-use. This initiative is at an early stage of its public use, but federates multiple actors in France that have been involved in mapping grassroots initiatives. It is an important piece of open source mapping infrastructure and may be a significant source of data about local initiatives in the near future. A much simpler mapping, but nonetheless powerful, is the mash-up performed by the Berlin social movement WIR BLEIBEN ALLE: it superimposes 13 maps related to gentrification, housing vacancy, or co-housing (Figure 4)[27]. It allows the reader to select the maps it wants to visualize, navigating through various facets of the housing problem in Berlin that each map is illustrating. Last but not least, a real type could have been described around the practice of collaborative semantic mapping. Indeed, the mapping of alternative economies always implies the (co-)definition of semantic categories to describe the complex realities that are represented in maps. While this process is more or less participative depending on the design decisions of mapping facilitators, collaborative tools for semantic mappings have recently emerged. Metamaps is one of them, allowing anyone to start, or duplicate a semantic map and engage others in the effort[28]. Each user has the possibility to reuse existing semantic nodes from other maps resulting in networked mapping dynamics. The tool is increasingly being used by communities to explore new forms of digital collaboration and it can provide opportunities for action researchers looking for tools to engage in the participative mapping of discourses from and about alternative economies[29]. The work of the Real Economy Lab prefigures how this can be used for investigating alternative economies [30].

25 , accessed on 20/09/2016.
26 , accessed on 20/09/2016.
27 , accessed on 04/10/2016.
28 , accessed on 23/09/2016.
29 For illustration, readers can have a look at a mapping of the *platform cooperativism* ecosystem that I initiated: , accessed 07/10/2016.
30 , accessed 23/09/2016.

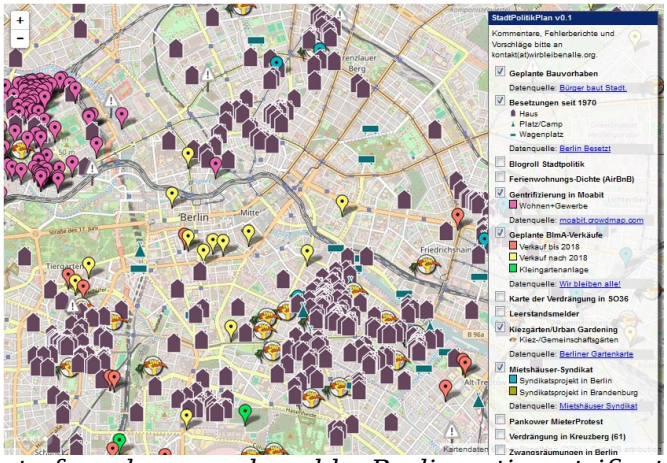

Figure 4: Screenshot of mash-up produced by Berlin anti-gentrification movement WIR BLEIBEN ALLE.

3.3. Ideal types of mapping processes

While interviewing mapping initiatives, but also being a participant of the Transformap collective and interacting with dozens of mappers, it became clear that there were a few distinct ways to design the process of producing and maintaining a map, in other words the mapping process. Because often, various processes may be intertwined, they are presented here as ideal types that may or may not be found in their pure state in the field. However, such mental images can help the observer navigate the seeming chaos of the field.

3.3.1. The survey

The survey is a traditional method for collecting data and also the most commonly used by the maps we have observed. It involves a person or an organization collecting data from initiatives in order to populate the map. Not surprisingly, the survey itself may be realized through various media: e.g. telephone, online survey tools, emails. The survey may be a one-off effort, but in the case where an organization runs it in order to produce (and maintain) a directory, it tends to be repeated over time in order to update data. Often, and especially in the case of membership directories, this updating phase is informal, with an administrator inputting data as it comes due to interaction with the initiatives.

This ideal type is facing two types of issues. On the one hand, obviously, the survey requires maintenance in order to stay up to date. Researchers sometimes produce such surveys, accumulating rich data, but do not have the resources, or interest, to follow up over time. On the other hand, surveys are top down. The respondents generally do not have much agency in the process, from the definition of scope, to the frequency of updates or in the choice of license applied to the data.

3.3.2. Crowdsourcing

In this ideal type the collection of data is left open to anyone (the crowd) who is willing to contribute to the mapping exercise. While data is collected by a large number of people, map ontologies (the categories structuring the data to be harvested) are defined by a smaller number of people – usually the initiators – who retain privileges in order to maintain the focus of the mapping. To be successful, the number of participants matters: usually, the more, the better the data (e.g. up-to-date). An example of such a map is Mundraub, in Germany, a map of fruit-trees where over 40,000 participants use and contribute to the map

of over 24 000 points of interests (POIs)[31]. For this mapping it is interesting to note that the initiative switched from Google products to open source mapping software (Leaflet) and data (OpenStreetMap) at the demand of the contributors.

The main dilemma with crowdsourcing is the question of data quality. Various strategies exist to deal with it. In the Mundraub case, users are often encouraged to login to improve the quality of the data edits, but this isn't a systematic practice. Other maps such as imagination.social[32] allow editing without requiring users to login as a strategy to lower the barrier to participation. In any situation administrators may also take unilateral action to remove inappropriate content such as automatic spamming. "Map defacing" as in Ballatore (2014) was not a significant issue for the maps observed, issues are more related to ensuring that new entries fit the scope of the map which is often difficult in the case of maps such as Karte von Morgen[33] or the Colibris map[34] where it is defined in very broad and normative terms (e.g. "transformation", "fair", etc.). Thus, the Colibris movement map allows users only to suggest new entries, further filtering them.

3.3.3. Digitally mediated participatory mapping

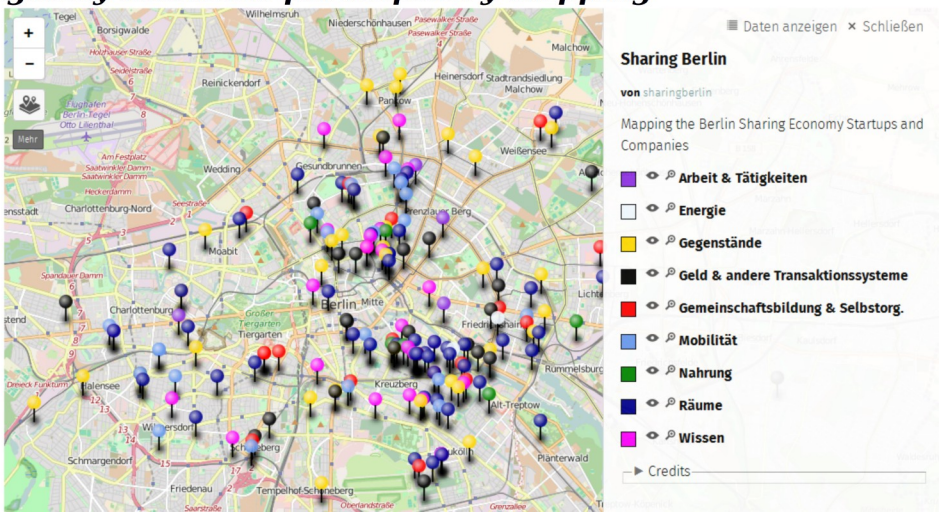

Figure 5: The Sharing Berlin map: The result of a Map Jam[35].

The practice of participatory mapping has been used for a long time as a method to generate collective knowledge among specific groups through the use of cartography. Here we describe an ideal type that relies on the same dynamic, but partly mediated by digital equipment (e.g. shared spreadsheet, Google Maps, uMap, etc.). Despite digital mediation, the results of the field work show that face-to-face interaction is crucial for such processes that rely on a significant amount of exchange around the definition of the final collective product (the map), the digital tools blend with and prolong the physical meeting(s). In addition, a participatory mapping is time-bound, with only a day or two for map jams. It therefore requires facilitation and preparation. Facilitators are usually initiating the mapping, framing it, and ensuring it reaches its objectives. While facilitators of participatory mapping have traditionally been researchers, the present empirical observation shows that the method has been adopted by activists alike. In the field considered, the most

31 Source: , accessed on 15/09/16.
32 , accessed on 15/09/16.
33 , accessed on 19/09/16.
34 , accessed on 19/09/16.
35 , accessed on 20/09/2016.

representative case of this process are Shareable's Map Jams where sharing activists have collaboratively produced over 70 city maps of the sharing economy[36]. The practice involves gathering activists over a day or two to co-produce a map, everyone comes with their own skills and without a blueprint. Maps jams are seen as a collective action to catalyze the sharing scene in a city or region. Results from field observations (interviews, action research) tend to confirm this effect, but further research would be needed to generalize and/or deepen those findings.

As in traditional participatory mapping, the main dilemma that occurs with this ideal type is about how much room is left by the facilitators for participants to define the scope of the exercise. What is to be mapped? Resources or initiatives? How to display the results? Which categories? Etc. This issue is well known by practitioners and researchers: the more participation, the more challenging it is to produce such a map at the end of the process. During Map Jams, the facilitators use materials prepared by Shareable, reducing the agency of individual facilitators and participants, but this makes it manageable enough for often unexperienced facilitators. Another issue lies in the follow-up. From this investigation, when participatory mappings have been facilitated by an organization, the mapping continues, being maintained and further developed. Otherwise, the map is usually slowly forgotten. In our observations, in only one occurrence (out of over 70), have such processes been a part of a (action) research project.

3.3.4. Remixing, hacking open data

The increased availability of open data creates more opportunities for mapping alternative economies. Datasets of associations, or businesses, specific features of the urban environment may be used for producing novel maps. This ideal type implies the identification of relevant datasets, and involves filtering (only subsets may be useful), refining (data may not always be accurate or sufficient), combining and enriching. In the case of Falling Fruit[37], activists regularly import datasets of trees, usually published by municipalities, filtered for edible sorts into a central database which is then completed by the crowd making it the largest global database of edible trees that we know of. In the case of 596 Acres, open data was built upon (verified, updated, expanded) if not hacked[38] and then brought into physical urban space in the form of individual signs hung on vacant lots[39].

One central dilemma with using open data is licensing. Aggregating datasets that are licensed under different terms can be problematic. Some licenses may not allow the publication of modified datasets. However the emergence of the Open Database License (ODbL) is technically lifting such barriers, but it was not widely used by the maps we inventoried. The second issue with this mapping process is the question of the data update. When datasets are aggregated and modified, one cannot rely on updates made by the initial publisher without a more complex synchronization setup. Unfortunately, these are not usually within the skillset and/or resource budget of grassroots organizations or small research teams.

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36 For a list of those maps that have not been individually added to the Transformap inventory: (Accessed on 4 August 2016). Further resources are available at .

37 http://fallingfruit.org/ , accessed on 31/10/2017.

38 The data obtained via a Freedom of Information Act request was not officially open when the initiative started and it was published without express permission. Its republication in an enriched version may have sped up its release as open data by local public agencies.

39 , accessed on 19/09/16.

3.4. Ideal types of (co-)producers

Similarly to mapping processes, theses ideal types intend to provide abstractions to help distinguishing the different types of actors and their motivations that are key in the production of maps. Again reality may show that behind a mapping initiative are hybrids of those ideal types.

3.4.1. The practice network administrator

Many of the maps studied have been produced by an organization (formal or not) whose mission is the promotion of a specific translocal practice (e.g. community gardening, repair cafés, hacker spaces). Its motivation is to make the practice more visible to the outside, but also to serve as a networking tool for initiatives that are often far from each other. The practice network administrators rarely have mapping or data management skills. These skills are learned by doing, but mapping is not necessarily the main focus so the time invested has to pay off and usually is at odds with the priorities of the mapper activist.

3.4.2. The mapper activist

The mapper activist believes maps are a very powerful medium for the diffusion of alternative practices. S/he is fiercely defends open source software solutions as well as open data licenses; which s/he sees as an essential part of the transformation embodied by the various alternative practices that are mapped. For the mapper activist the way the map is produced is as important as the final product. S/he sometimes has difficulty being understood by other actors interested in having a map ready.

3.4.3. The researcher

Researchers are not a very visible actor in the field we observed. They usually use data from existing maps for their own purposes. In some cases, they may start their own mapping initiative and generally communicate about the map only if it serves the aim of collecting data as they rely on crowdsourcing.

3.4.4. The anonymous mapper

From the material considered, the anonymous mappers are hard to pin down. They contribute with a few entries to a map they recently discovered. Their motivation is to share initiatives they are enthusiastic about. They may never return to the map after editing it once. They are hard to engage with, but when given the right conditions (simple interface, clear instructions) they may provide large amounts of data. They are the definition of what is commonly described as the “crowd”.

3.4.5. The initiative holder

Initiative holders are a coveted contributor to a map. They are those with the primary data. But, apart from cases that are commercially driven (rare in alternative economies), it is hard to provide them with the right incentives to maintain their data directly. They often see digital technologies as a burden.

3.4.6. The action researcher

The action researcher is the most seldom actor to be encountered. S/he sees their research as part of their object of study. They may be a PhD student who has enough time to engage in action on the ground. The action researcher is often a connector, bridging together academics and practitioners, but also different communities of practice (e.g. open source software with community supported agriculture).

4. DISCUSSION

As preliminaries one should briefly reflect on the way the practice of collaborative mapping can be documented. Indeed, I have presented it along a three-pronged approach from the practical necessity to be able to describe what type of maps exist, but also the ideal types of processes that may be involved in a mapping initiative, without forgetting the fact that people are actually running the show. That division, partly inspired by the commons literature (resource, rules, users) is problematic as it tends to suggest that there is such a thing as a finished map, a fixed representation, or a product. While the literature show the flaws in such an approach, arguing for a shift from *maps* to *mapping* that shows the processual nature of cartographic science (Herb et al., 2009; Kitchin and Dodge, 2007), but it proves somewhat unpractical for documenting real types. It has been challenging to describe existing mappings without referring to the way they are produced and maintained. The only case when talking about maps actually makes sense is when the mapping process has died out. But, in this situation the value of the map for informing the reader about alternative economies is quickly eroding as the data becomes outdated.

4.1. What can we learn from mappings of alternative economies?

Feola and Butt research on the Transition Network and buying groups (2015) is the only example I found of academics using existing maps of alternative economies for geographic analysis. They show that these can be used for understanding the spatial diffusion of grassroots innovation by documenting that cross-movements collaborations and transfers do play a greater role than expected. More research may take advantage of the data available through the numerous maps we have inventoried in the Transformap's atlas. Map directories in particular display the greatest potential for such work as they focus on clearly defined practices or networks (grassroots innovations) and because they are usually regularly updated. However, the lack of versioning of those maps may prove challenging for longitudinal studies. In addition, researchers should be wary about the aggregation of similar mappings, not only for traditional concerns about data comparability, but also because those mappings are often more than mere representations of existing objects, they are also ontological endeavors.

In that sense, I argue that studying those mappings may inform the research on alternative economies about emerging ontologies and vocabularies used to describe emerging forms of economic activity that may differ from those used by Google, the dominant and global device of complexity that impacts the way people assign meaning to the world (Paradiso, 2011). In addition, mappings of urban assets bring visibility to untapped public resources which can be leveraged to develop new forms of community economies. Researchers have the opportunity to spread those knowledges as suggested by Gibson-Graham (2008). The specific technique of open tagging of initiatives in crowd-sourced maps such as the I-Share mapping seems highly promising in generating vocabularies from the bottom-up that are useful in describing new economies or resources. Current technological developments such as collaborative semantic mapping and linked open vocabularies[40] may open significant opportunities to scale such practice as explored by Curalta et al. (2015) in the case of the Social and Solidarity Economy. On a more trivial level, the maps themselves and the taxonomies they may display are formal documents that can be used as research material, which are usually difficult to obtain from movements often

40 See , accessed on 07/10/2016.

more preoccupied with action on the ground than documenting the ontological foundations of their practice in formal ways.

But again, not losing sight of the fact that *maps* are really *mappings*, it may be even more interesting to explore the discursive tensions that the formalization of an ontology generated inside a community of practice or network. Similarly, and following Turnbull (2007), it may be productive to explore the tensions or cooperations that emerge when confronting divergent ontologies while for example attempting to merge two mappings. In those two cases, action research seems inevitable.

4.2. The performativity of mappings

In the literature review I argued that maps of alternative economies can be usefully reframed as mappings whose value resides in their performative nature. I argue that this reframing is indeed valuable for understanding the nature of existing mappings. While presenting the real type 'the map with loose boundaries' it indeed appears that mapping as a practice is used by activists to perform the existence of new economic forms or movements. Similarly, maps of urban (public) assets uncover untapped resources performing the existence and availability of that resources, and, therefore, a new field of possibility that enable new forms of collective action. In that sense, the map *creates* a new reality rather than *describes* an existing one: it is an ontological intervention rather than epistemological. Therefore, such mappings are eminently performative and of ontological nature resonating with previous claims (Crampton, 2009), but also always transitory, relational and context-dependent (Kitchin and Dodge, 2007). Indeed, mappings of urban assets only exist because they are connected to grounded material practice, they are just (digital) means. In that sense *mappings* – and not *maps* – seems to be a particularly fitting approach, adding to the tools and techniques available for researchers involved in the ontological project of performing alternative economies (Gibson-Graham, 2008).

4.3. Collaborative mapping as an empowering knowledge practice

Calling on researchers to engage with mappings of the alternative economy cannot avoid a discussion of the ethical dimension of doing so. Indeed, I formulated the hypothesis that collaborative mapping is a practice that empowers citizens to deploy and perform alternative ontologies of economic processes and interactions, answering a key concern regarding citizen engagement in the making of science (Nascimento et al., 2014). This is important because it contrasts with a record of transdisciplinary research and citizen science that has largely failed to empower citizens (Brandt et al., 2013; Nascimento et al., 2014). The mappings that we have presented in the results are massively driven by citizen activists, with only a small if not marginal fraction being academic efforts. Now, as established in the literature review there is a call for scholars to engage with these communities (Miller et al., 2014), openly collaborate in knowledge production (Cornell et al., 2013), advance collaborative methodologies (Wiek et al., 2012), favour process-oriented knowledge production (Wittmayer and Schäpke, 2014), support the creation of diverse knowledges (Gibson-Graham, 2008), etc. Approaching existing mapping initiatives to find ways to support them, and leverage knowledge co-production seems a logical next step. But, because those mappings are performative and, above all, a space where citizens can, at last, enjoy agency in producing knowledge, action researchers should be very careful in the way they approach such mapping initiatives. Assessing previous academic efforts to use collaborative mapping of alternative economies is needed to better understand how researchers may proceed while increasing the agency of

citizens in such processes and not undermining their mission. To this end, it is worth mentioning the US mapping of the Social and Solidarity Economy that mostly used surveys in collaboration with the practice networks[41], the I-Share mapping of the collaborative economy in Germany relying on crowdsourcing to generate vocabularies, and last but not least Collporterre's mapping of collaborative consumption in the Bretagne region that was largely based on a participatory action research process. These all display varying levels of agency for participants. Looking into existing literature may provide a further basis to evaluate the various roles researchers can take in such arenas (Wittmayer and Schäpke, 2014). Nevertheless, such work should be updated to contexts of action where digital technologies are a defining feature. Thus, scholars could use academic resources to host critical mapping infrastructure, train activists to mapping technologies making use of GIS expertise, and contribute to networking efforts such as Transformap that seeks to bring those mappings into a digital conversation.

4.4. The critical role of licenses and infrastructure in commoning knowledge

By framing knowledge as a commons the researcher's attention is drawn to a series of social dilemmas that may threaten knowledge (Hess and Ostrom, 2007). Time in particular shows that results are problematic and requires constantly updating maps' data. Crowdsourcing has been shown to be a potential response to this dilemma. Another dilemma is the enclosure of those knowledges that are mappings of alternative economies. It is a fact that most mappings inventoried in Transformap's atlas are not licensing their data which stands as a roadblock to reusing and building upon such knowledge. Data (and ontologies and vocabularies) therefore lives in silos. While researchers often do not care about asking authorization to use data for their analysis it may be problematic for anyone wanting to publish remixes of others mappings. Open licenses such as the Open Database License (ODbL) could address that issue in a similar way that the GNU license did for the successful development of open source software (Schweik and English, 2012). Academia in collaboration with established practitioners' organizations (e.g. Open Knowledge Foundation) could have an instrumental role in making mapping initiatives aware of good licensing practices and of its benefits to "foster an environment where new facts can survive" (Gibson-Graham, 2008, p. 629).

Last but not least, infrastructure provision is key for the practice of collaborative mapping. As shown with Map Jams, the availability of free and user-friendly mapping applications such as Google Maps, and collaborative tools such as shared spreadsheets, have made collaborative mapping accessible to laypersons. But this may come with hidden costs. As Fuster Morell (2014) emphasized, digital infrastructure is not neutral. Relying on proprietary and freemium applications may backfire as users seldom understand the Terms of Use they abide to. Indeed, exporting geo-locations that were produced by Google services to another service is not allowed. While this may not pose a problem for small grassroots initiatives, that may show problematic for larger and more systematic mappings. In addition, owning their own mapping infrastructure enables initiatives to customize it, seize new opportunities, and respond to evolving demands from communities. Thus, mappings like Mundraub or 596 Acres have developed simple social networking features embedded in their mapping platforms. With very limited financial resources, this was only possible because those initiatives rely on open source software. Similarly, by using its own instance of semantic mediawiki, the list of hacker spaces enables a distributed mapping effort that displays numerous ways to navigate the data.

41 , accessed on 07/10/16.

Again, academia may support grassroots mappings of alternative economies by lending expertise (if any) in open source solutions or supporting existing open source applications such as uMap (the alternative to Google Maps) by deploying instances on their own servers or even better supporting grassroots collectives that do so (e.g. Transformap). This would require collaboration across university departments and disciplines. This could be one step in providing collaborative (mapping) infrastructure as a commons as recommended by Fuster Morell (2014) and Frischmann (2012).

CONCLUSIONS

Looking at maps of alternative economies confirms that reframing those as mappings is a valuable approach for examining these new research objects in their complexity: as sources of data, yes, but more importantly as performative, political, and participative practices. Beyond being mere digital equipment or representational objects, the mappings we considered are also formalized alternatives ontologies that have a strong potential for performing new economies. They are therefore higly valuable to the study of alternative economies – such as urban commons – understood as a performative ontological project. This presents an opportunity to address the recognized need to open up knowledge systems in search of sustainability solutions, while at the same time opening avenues in addressing the issue of low citizen empowerment in (sustainability) science and beyond. Eventually, I argued that the commons approach – with a focus on licenses and infrastructure provision – is decisive in understanding the dynamics and challenges of digital knowledge co-production, an issue that is largely overlooked in the fields of economic geography and sustainability science.

As a closing comment, I would like to mention the fact that the Transformap collective has put together a broad, although embryonary, open source infrastructure[42] to enable a bottom-up convergence of mappings of alternative economies including a forum[43], a wiki-atlas[44], a chat-channel[45], online pads, an API[46], a map viewer[47], and a customized OpenStreetMap editor[48]. A wiki was recently deployed to facilitate comparisons and match-making between ontologies/taxonomies of two or more maps of alternative economies[49]. This could prove useful for exploring the tensions generated by the confrontation of different ontologies. It is also a key socio-technical component in enabling the pluralistic joint visualization of mappings that Transformap strives to perform - the convergence of alternative economies that many activists call for. I encourage researchers to join the effort, there is plenty to do!

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42 , accessed on 08/10/2016.
43 , accessed on 08/10/2016.
44 , accessed on 08/10/2016.
45https://matrix.allmende.io/_matrix/client/#/room/!JxSVcUkWaKRiETPsxS:matrix.allmende.io, accessed on 08/10/2016.
46 , accessed on 08/10/2016.
47 , accessed on 08/10/2016.
48 , accessed on 08/10/2016.
49 , accessed on 07/10/2016.

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6.2 Article 2

Commoning the City, from Data to Physical Space: Evidence from Two Case Studies

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ABSRACT

This article describes the phenomenon of commoning the city. It is understood as the co-production of new resources and/or the process of reclaiming existing assets (public or private) as a commons. We report on two original case studies (in New York City and Berlin) where the constitution of a data commons has been the starting point of a wider process of commoning the urban physical space: vacant public land on the one hand, and public fruit trees and other urban edibles on the other hand. Commoning the city in the digital age is therefore described as a hybrid process spanning over from the digital to the physical urban space, online and onland. In contrast to the smart cities approach, it lays a more citizen-oriented narrative of the impact of digitalization on urban life. This article addresses the research questions: How does the hybrid commoning process of (1) data and the related (2) public space take place? What is the role of the grassroots providers of the collaborative mapping infrastructure? Methodologically, the case study analyses are structured following existing adaptations of the Institutional Analysis and Development to the specificities of knowledge/information commons by Frischmann, Madison et al. (2014). Results show that, beyond appearances, the commoning of data is mostly a means, attracting visibility and attention, for an end: the wider commoning of urban land. The true focus of the action arena resides around the self-governance of land and trees and the constitution of local communities. A trend in the evolution of the role of local authorities towards a more collaborative state is confirmed and seems partly explained by increasing financial austerity forcing local governments to rely more on local civic actors. Another reason is that data makes city government more porous to bottom-up action. However this requires good practice in opening urban data sets, the existence of local civic capacity, and active community organizing (much) beyond the digital world. We conclude by suggesting an analytical departure from the IAD framework and its naturalist conception that approaches the commons as a resource and, as a consequence, forces an artificial divide between the intangible and tangible dimensions of the commoning process. Subsequently, we recommend approaching the phenomenon we identified as 'commoning the city' as a living practice of collaboratively producing a shared experience of the place, where the intangible (data) and tangible (land), the human and non-human, are seen as a whole.

KEYWORDS

Commoning, Public Space, Knowledge Commons, Open Data, Diverse Economies, Grassroots Innovation, Urban Foraging

INTRODUCTION

In times of widespread austerity measures, the self-governance of shared resources is entering the spotlight as an alternative to privatization. In the city, urban commons emerge when local public management has receded and citizens take over (Foster, 2011), or when new resources are produced by commoners (Borch and Kornberger, 2016). The breadth of urban resources analyzed as commons has rapidly expanded from parks, green spaces, and public squares to various neighborhood amenities or urban infrastructures (Dellenbaugh *et al.*, 2015; Foster, 2011). However, for Harvey (2012), the urban commons is to be defined more broadly, such as in the intangible value of neighborhood life: the permanent production and appropriation of the urban commons by private interests being a defining feature of urbanization itself and the stake of the commoners' struggle for their "right to the city"(Harvey, 2012).

Considering urban data as a commons is unorthodox, for "data is the new oil"[50], regarded as a resource to be extracted as a commodity for markets. Seeing urban areas as great deposits of data, and keen to benefit from a new extractive industry, IBM and its competitors re-branded some of their information systems business under the concept of "smarter" or "smart cities", promising prosperity and sustainability through the optimization of information management (Dirks, Gurdgiev and Keeling, 2009; IBM Global Services, 2009). Commentators increasingly critique this top-down and technology-centric epistemology of the smart city vision, and call instead for alternative approaches, shifting the focus to smart citizens and their rights to the digital city (Foth, Brynskov and Ojala, 2015, vi). As we look into the tall shadow of the smart city discourse to uncover the work of (smart) citizens reclaiming their right to the digital city, the urban commons, it may be of interest to see how a commoning process may involve physical space as well as data, side by side.

By describing existing processes of commoning the city, we may better understand how the city itself may be thought of as a commons, as proposed by Foster and Iaione (2015).

The remainder of this article consists of a theory section, describing developments in the literature from urban commons to commoning, followed by a review of the literature on a particular category of intangible commons: knowledge commons. We present our adaptation of a seasoned framework to address case studies. The methods employed and considerations of collecting empirical material follow. In the results section, we present the main findings of two case studies from Berlin (Mundraub) and New York City (596 Acres). These are discussed in the context of the existing literature. Finally, we suggest further research directions and avenues for activists and local governments for the commoning of urban assets.

50See (accessed 28/04/2017) for a non-comprehensive inventory of scholars, businesses, and policy leaders using that vocable.

THEORY

From urban commons to commoning the city

The first substantial theoretical discussion of commons in an urban context has to be credited to Sheila Foster (2011), who highlighted the ways in which shared urban resources such as parks, vacant land, streets, or business districts are managed by groups of users in the absence of government management and without privatization of the resource. Foster emphasizes that commons dilemmas, such as overuse or rivalry between users around an urban resource, emerge as a response to a withdrawal of public regulation in a previously highly regulated space; she calls this phenomenon “regulatory slippage”: "In simple terms, regulatory slippage refers to a marked decline in the enforcement of these standards that define the use of the resource/space in question and/or the increasing tolerance of noncompliance with these standards by users of a given public space" (Foster, 2011, p. 67). In her landmark study, Foster observes in some cities a shift from a centralized form of government to what she calls an “enabling” role of state and local governments in supporting private actors to overcome freeriding and coordination problems in the collective management of urban resources (Foster, 2011). This argument is further developed in “The City as a Commons”, where the emergence of co-management of municipal services and the co-production of urban commons are the two pillars structuring an ongoing transformation of urban governance from a controlling state (the Leviathan) towards a collaborative state (the Ubuntu) (Iaione, 2016). Epitomizing this approach, the city of Bologna adopted in 2014 a “Regulation on Collaboration between Citizens and the City for the Care and Regeneration of Urban Commons” (*Regulation on Collaboration between Citizens and the City for the Care and Regeneration of Urban Commons* 2014). In this enabling role, the government may ensure that formal agreements for cooperative management of public resources are time-limited, in order to reduce the risk of ossification, a process whereby commons institutions become static and rigid in the face of a changing environment (Foster, 2011, pp. 130–132).

A handful of other authors have thematized commons in the urban context: as an alternative to privatization in a context of budgetary austerity (Stelle Garnett, 2011), as a key resource in building resilience in cities (Colding and Barthel, 2013), or as the result of the civic activation of public space (Radywyl and Biggs, 2013). De facto, the academic discussion about urban commons has focused almost exclusively on tangible resources. A notable exception is Foster and Iaione (2015), who take into account the existence of intangible (e.g., sense of safety or social networks) or digital (e.g., data or infrastructure) goods as urban commons. This is reflected in their significant contribution to shaping the City of Bologna regulation (2014). This intangibility of the commons is evident in David Harvey’s analysis (2012), where he describes the urban commons as the co-created value of a neighborhood, and the commoners’ struggle to protect it from private appropriation as the cornerstone of citizens’ rights to the city. Harvey recognizes a “social practice of commoning” established between a social group and an aspect of its environment considered as a commons (Harvey, 2012, p. 73). Similarly, commoning is also used to describe the resistance to enclosure, the opening of new commons (Dwinell and Olivera, 2014), or the process whereby a community reclaims an urban resource as a commons (Sundaresan, 2011).

A more anthropological and historical strand of the literature also switches to the verb form “commoning”, giving more room to the changing nature of urban commons (Linebaugh, 2008). Thus, for Bresnihan (2016), commoning emphasizes the fluid, continuous nature of the production of urban commons understood beyond the “objective limits” of a static, physical resource, but also integrating people, physical space, materials, technologies, and knowledge. Here, the commoning process inherently extends beyond the tangible resource.

Knowledge commons: The IAD framework

Commons have often been analyzed through the Institutional Analysis and Development (IAD) framework, which has mostly been applied to the governance of rural tangible resources such as forests, fisheries, or irrigation systems (Ostrom, 1990). More recently, it has also been successfully extended to intangible resources such as open-source software (Schweik and English, 2013), online creation communities (Fuster Morell, 2014), and genomic data (van Overwalle, 2014). Indeed, as Christine Hess and Elinor Ostrom argue:

> *"[The IAD] framework seems well-suited for analysis of resources where new technologies are developing at an extremely rapid pace. New information technologies have redefined knowledge communities; have juggled the traditional world of information users and information providers; have made obsolete many of the existing norms, rules, and laws; and have led to unpredicted outcomes. Institutional change is occurring at every level of the knowledge commons."* (Hess and Ostrom, 2007, p. 43)

The most prominent adaptation of the IAD to knowledge/information commons is to be credited to Madison, Frischmann et al. (Madison, Frischmann and Strandburg, 2010). They define constructed commons in the cultural environment (in contrast to the *natural* environment) as “environments for developing and distributing cultural and scientific knowledge through institutions that support pooling and sharing that knowledge in a managed way” (Madison, Frischmann and Strandburg, 2010, p. 659). In a more recent definition, Frischmann, Madison et al. (2014, p. 3) adopt the terminology “knowledge commons”, defined as “shorthand for the institutionalized community governance of the sharing and, in some cases, creation, of information, science, knowledge, data, and other types of intellectual and cultural resources." In this article, to avoid ambiguity, we prefer to speak of a commoning process to describe this community governance, and reserve the use of “commons” to describe the shared resource as is often the case in the literature (Hess and Ostrom, 2007, p. 3).

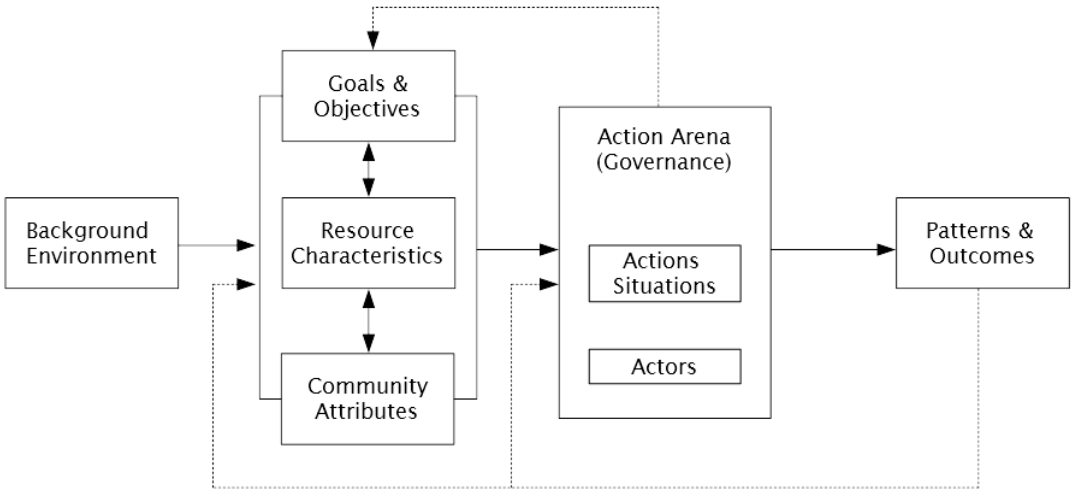


Figure 1 The IAD framework for knowledge commons. After Frischmann, Madison et al. (2014)

In the present study, we use our own adaptation of the IAD framework for knowledge commons (Figure 1) in its most recent version by Frischmann, Madison et al. (2014). In this framework, a Background Environment is seen as a given in the study of a knowledge commons. It influences a set of Attributes that are interconnected: Goals and Objectives, Resource Characteristics, Community attributes. These define the governance (and possibly production) of the commons — the Action Arena in which actors interact through various Action Situations. This results in the emergence of Patterns of interaction that may solidify over time and generate Outcomes such as the creation, expansion, or degradation of a new or existing knowledge commons. In a feedback loop, these Outcomes will in turn redefine the initial set of attributes or, more directly, influence the structure of the Action Arena, with for example the emergence of new Patterns of Interaction creating new Action Situations.

An apparent difficulty, in applying the IAD for knowledge commons to our hybrid cases characterized by the presence of both tangible and intangible resources, lies in the fact that the framework has previously been adapted by Frischmann et al. (2014) through two main modifications intended to fit intangible resources (knowledge).

1) The resource does not predate the community, but is produced as the community develops (a fundamental difference from natural commons Frischmann, Madison and Strandburg, 2014, p. 19 that explains the interconnection between Attributes).

2) In the production of a knowledge resource, the "Patterns of Interaction" — the interaction of people with the resource and one another — are themselves an intended "Outcome" and inextricably linked with the knowledge output of the commoning process (Frischmann, Madison and Strandburg, 2014, p. 19).

In the urban environment, tangible resources may predate the emergence of a community of users, but may not be in use and thus not perceived as a resource (e.g., vacant land). Thus, analyzing the commoning rather than the commons, i.e., the process by which existing resources are reclaimed and used as commons, may actually benefit from these adaptations, as they emphasize the dynamic character of the process.

Moreover, Frischmann, Madison et al. (Schweik and English, 2013, p. 238). Emphasizing this aspect, Fuster Morell (2014) argues that infrastructure provision (in our case studies, the provision of an online mapping platform) is not neutral for online creation communities and should therefore be integrated into the Governance process (Action Arena) rather than forming part of the Resource Characteristics as in Schweik and English (2013). This provides a theoretical avenue for extending our understanding of the provision of a participation infrastructure beyond the digital realm, taking into account the changing role of the local state that would traditionally manage a highly regulated urban space (Foster, 2011).

RESEARCH QUESTIONS

In this article we use the IAD as refined by Frischmann, Madison et al. (2014) to elucidate the main interrogation: How does the hybrid commoning process of (1) data and the related (2) public space take place? In particular, we seek to understand the role of the participation infrastructure providers (mainly grassroots initiatives) in the creation of a community of users that is both a pattern of interaction in and an outcome of the commoning process.

Materials and methods

We chose a case study approach, as this has been widely used to analyze commons (Poteete, Janssen and Ostrom, 2010). Case study research is seen as particularly appropriate for explorative and evaluative research, and supports conceptual refinement and theory-development (Poteete, Janssen and Ostrom, 2010, pp. 34–35) as in the present study. The description of such (rather hidden) phenomena may also make them more real and credible to policy and activism, making the research itself a performative ontological intervention (Gibson-Graham, 2008).

The two case studies were chosen for their similarities. In both cases, data about the urban space (vacant lots and growing edibles) is being collaboratively produced or reclaimed, and refined into an open and shared resource by a citizens' initiative — a knowledge commons (Frischmann, Madison and Strandburg, 2014; Fuster Morell, 2014; Hess and Ostrom, 2007). Yet, for both initiatives, that intangible commons is only a means towards an end; by being made actionable through the use of a mapping platform and further actions including community building, it results in a new, collective form of public land use: urban foraging on the one hand (Berlin); community spaces such as gardens on the other hand (NYC). What used to be neglected public assets — fruit trees and wasteland — are turned into shared resources that provide opportunities for community activities, reconnection to nature, food production, and DIY practices.

To structure our study we rely on an IAD framework for knowledge commons adapted for hybrid urban commoning processes that combine an intangible and a tangible resource. Table 1 presents a condensed version of the framework, including representative and operational research questions proposed by Frischmann, Madison et al. (2014) and completed with Fuster Morell's (2014) focus on infrastructure provision (in Governance).

Table 1. Proposed operational framework for hybrid urban commons. Adapted from (Frischmann, Madison and Strandburg, 2014)

Representative research questions to apply simultaneously to the intangible and tangible dimensions of the commoning process: (1) about and around data; (2) about and around vacant public land and growing edibles
Background Environment
• What is the background context (legal, cultural, etc.) of this particular commoning process and the default status of the resource involved (patented, copyrighted, open, or other)?
Attributes
Goals and Objectives
• What are the goals and objectives of the commons and its members, including obstacles or dilemmas to be overcome?
• What are the history and narrative of the commons?
Resource Characteristics
• What resources are pooled and how are they created or obtained? What are the characteristics of the resources? Are they rival or nonrival, tangible or intangible? Is there shared infrastructure?
• What technologies and skills are needed to create, obtain, maintain, and use the resources?
Community Attributes
• Who are the community members and what are their roles? What are the degree and nature of openness with respect to each type of community member and the general public?
Governance
How is the participation infrastructure provided? Who has a say in its development? Does it allow horizontal organizing (i.e., without control/facilitation from the infrastructure provider)? Is the design of the infrastructure open? (added after Fuster Morell, 2014)
• What are the relevant action arenas; how do they relate to the goals and objective of the commons, and the relationships among various types of participants, and with the general public?
• What are the governance mechanisms? Who are the decision makers and how are they selected? What are the institutions and technological infrastructures that structure and govern decision making?
• What informal norms govern the commons?
• How do nonmembers interact with the commons? What institutions govern those interactions? What legal structures (e.g., intellectual property, subsidy, contract, licensing, tax, antitrust) apply?
Patterns of Interaction and Outcomes
• What benefits are delivered to members and to others (e.g., innovations and creative output, production, sharing, dissemination to a broader audience, and social interactions that emerge from the commons)?
• What costs and risks are associated with the commons, including any negative externalities?

The case study data were collected between 2014 and the beginning of 2017. Data collection was conducted in the form of participatory observation, both online and onland. We crafted the neologism "onland" to reflect the fact that even when the action is situated in the physical space it is not necessarily *offline*: people increasingly using mobile Internet access, blurring the line between offline and online[51]. We gathered primary data through single, semi-structured interviews with one founding member of each initiative, a key executive member of a relevant local administration in each city, and three participants in Berlin (seven formal interviews in total). Interviews in NYC were conducted via VoIP (i.e., Skype). This was completed by extensive online documentary research

51This phenomenon has been described as "net locality" Gordon and Silva (2011), but the expression does not allow its use as an adverb, and diminishes its practical usability. Previous isolated use of "onland" contrasted "a traditional classroom environment" to an *online* learning space Shelley, Swartz and Cole (2008).

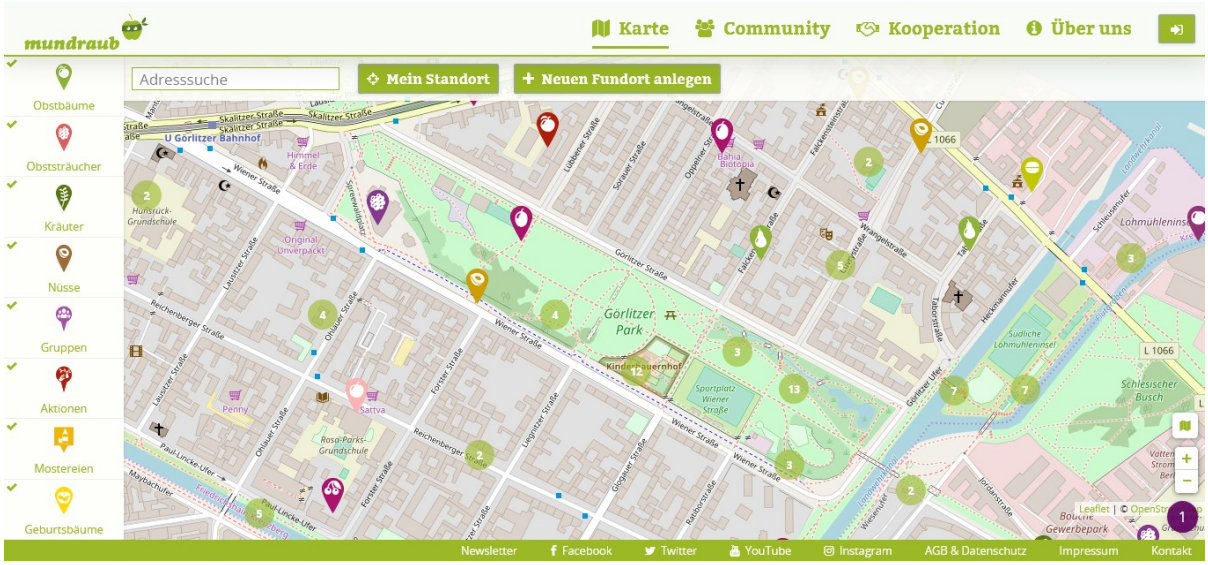
facilitated by the vast digital self-documentation of the initiatives: blog posts, articles by the initiative in publications or conferences, third-party publications (press and grassroots blogs), etc. In addition, our research objects include the online platforms themselves, which we used to gain first-hand knowledge of the online collaborative process. We were thereby able to observe how the platforms evolved over approximately three years, and to make direct use of the data they provided (e.g., number of NYC administrative agencies having ownership of land).

RESULTS

Mundraub, Berlin

Background environment

While existing cadasters of trees situated in public space are maintained by borough administrations and theoretically accessible to the public upon request ("we have no secret to hide" says a Berlin administration executive[52]), they are in practice and historically not freely accessible. The reasons advanced by public actors range from liability issues or economic argumentation to technical difficulty: "I guess [citizens] do not have the proper software" says the same administrator[53]. The status quo in the physical space is that citizens are required to file a request to their borough's administration to forage from public trees, while pruning remains the exclusive domain of municipal employees or subcontractors. In practice, most foragers (with the exception of schools) generally ignore, willingly or not, the need to secure authorization for harvesting fruits, and borough administrations seem to show no particular concern about enforcing this: i.e., there is regulatory slippage. Generally, fruit trees have comparatively high maintenance costs and are therefore not a favored option by a financially-constrained municipality. Starting in 2011, a neighborhood group (unrelated to Mundraub) in collaboration with the Berlin-Kreuzberg borough administration successfully planted a relatively large number of fruit trees in Görlitzer Park, one of the most popular parks in the city[54].



52Interview in February 2017.
53Ibid.
54The initiative "Obstbäume in Görli," source http://obstbäume-im-görli.de/ (accessed 09/10/2017).

Figure 2: Map screenshot from . Clustered points of interest split into individual points when zooming in.

Goals and objectives

Mundraub started in Berlin in 2009 from an individual initiative. Shown in Figure 2, its main product is a collaborative map platform that crowdsources and visualizes the locations of most common types of fruit trees and bushes in German-speaking countries. Each tree or group of trees is marked by a point of interest (PoI) that can be reviewed, complemented with pictures and descriptions. Although apple picking for cold-pressing juice is a relatively common practice nationally (nabu.de, no date), urban foraging was a very hidden practice before the launch of Mundraub. The motivation for co-producing a data commons in the form of a collaborative map is to enable people "to discover the secret fruits in public space and [eventually] to collectively shape the edible landscape" (mundraub.org, no date) through the practice of (urban) foraging. The constitution of a data commons, that substitutes for inaccessible and incomplete public data, is not separate from the wider process of commoning the edible landscape. On the contrary, it is seen by the Mundraub initiative as a constitutive tool of one wider process of public re-appropriation. One central dilemma is to create a sense of responsibility and to spark collective action among people who are first reached through the Internet — a medium that favors anonymity and individualism. That same anonymity and the impossibility of effective control are also to be found in the urban public space in which the edibles are situated. Such scenarios often invoke the freerider dilemma, as illustrated in the words of a Berlin urban forager:

> "I would be worried to add [on the map] trees growing in the neighborhood. Trees with some tasty fruits, and I add them and they are immediately fully harvested. […] I also think there should be something left for birds and so on. I am not sure that people share this kind of notion."[55]

Historically, trees and greenery in cities are only valued for their esthetic value, and managed accordingly, top-down, by the municipal administration. Mundraub's narrative is to bring awareness to citizens about urban nature by re-conceptualizing it as an edible resource with which they can directly engage through harvesting, care, and further planting.

Resource characteristics

However, the respective commoning of data and the related physical urban space are facing different types of challenges due to the differing nature of the resources in question: nonrival and intangible for data, versus rival and tangible for edibles. The intangible resource is constantly expanding, with an ever-growing number of people adding new points and reviewing existing ones. Since 2016, municipal data are also slowly being added as a result of Mundraub and its wider community advocating for local governments to open their tree cadasters. While such data are still marginal, this process of data release is very likely to increase significantly in 2017 and 2018 as the initiative concretizes long-term lobbying efforts and further adapts its online infrastructure to facilitate data imports. The development and maintenance of this collaborative mapping infrastructure is made possible by in-house and subcontractor programming skills organized by the Mundraub initiative. Consulting and contributing to the map itself was made very easy, and it is accessible to most Internet users with basic digital literacy. Similarly, harvesting well-known edibles generally requires little skill. However, identifying

55Interview in January 2017.

more unusual edibles such as wild fruits or herbs is not accessible to everyone, and the map may therefore be a precious tool for finding such when images are available. Some basic knowledge of handling trees with care is also critical to ensure that foragers do not damage a resource that regenerates very slowly. Indeed, Berlin boroughs plant few edible trees as these require greater maintenance that cannot be afforded under severe budgetary constraints. Thus, in December 2016, and in collaboration with the Berlin-Pankow borough, Mundraub crowdfunded the planting of twelve fruit trees in a public park. A similar action on the private land of a supermarket led to the planting of five trees. Both actions are pilot projects in a testing phase that may result in more planting, both in Berlin and beyond, and which raises a question: Will people continue to take care of trees from which fruits may be harvested by anyone?

Community attributes

The small staff (3 to 5 employees) of the Mundraub initiative are formally employed by the non-profit enterprise (gUG in German) Terra Concordia. It plays a key role as infrastructure provider, maintaining and developing the online portal built around the map. Staff members also dedicate a considerable amount of their time to engaging throughout Germany with municipalities and citizens to propagate the practice of urban foraging and its acceptance among local governments. Anyone can take part in Mundraub, and, a fortiori, in urban foraging. Online, anyone can consult the map, although visitors need to register in order to contribute to it or to access online discussion groups. As of October 2017, almost 60,000 people have registered (almost doubling in two years), and many more have consulted the map (however, traffic statistics are not available). Onland, and in practice, anyone can forage even if it formally requires municipal authorization. Generally, we observed difficulty in building a real, lasting community of urban foragers, be that online or onland. Activity on the platform's forum is low, and is limited on a self-organized Facebook group where Mundraub only engages in minimal so-called community management. Onland, two types of action seek to build a community. On the one hand, a handful of community organizers, who may be professionals or volunteers, are organizing community actions such as foraging tours to learn more about urban edibles or to press apples together. On the other hand, tree sponsoring is possible since the end of 2016, for anyone willing to make a donation (around 100 euros) and commit to caring for the tree in its initial years. Tree sponsors are encouraged to collectively organize, to plant and ensure good care for the tree.

Governance

The development of the online platform itself gives little room for users' involvement. There is actually very little demand for that, which may result from an online experience in which interaction with other users is very limited. Specific demands, however, are implemented punctually, as in the case of the switch from Google Maps as a base layer to OpenStreetMap, a map commons. The code for the platform is not open source, since Mundraub views this as an asset of the organization — not of the community. Similarly, the data (while freely visible online) are copyrighted and not reusable. Researchers are usually granted access to the raw data. The Mundraub leadership considers that it has a responsibility to ensure the data are in good hands and taken care of: "contributors provided the data to us, on our website, they have entrusted us with it[56] and [we] are liable for that." Rules regarding the way in which data are contributed and then managed are

56Interview in June 2015.

defined — unilaterally — in the website's Terms of Use by the infrastructure provider, which has exclusive privilege over rectifying, editing, and deleting data. Nevertheless, when users flag inaccurate or inappropriate data, the complaint is first sent to the initial contributor who is given an opportunity to rectify it: "the community has grown so strongly that it is checking almost on its own [the compliance of data]" says a Mundraub staff member[57]. Beyond that, users are not involved in the governance of the online infrastructure and data: We cannot observe any arena for such actions, apart from the editing of individual points. It seems that all actors involved view this only as a tool for the commoning of the physical resource (where the real action arena is). It is really in the interaction of Mundraub and other grassroots actors with the administrations and local governments of Berlin boroughs that the main action arena is situated, particularly in Berlin-Pankow where the first policy outcomes were observed. In the shadow of these formal contacts, the everyday practice of urban foraging in public space is a more diffuse action arena, where a slow transformation in the way the public relates to the urban landscape may be observed but hardly measured. The emergence of rival use is answered by a set of voluntary rules published by Mundraub, although lacking verifiable impact. The general governance of urban space is very rigid, as many vital urban interests such as transportation take precedent over most other priorities: thus, trees allowed along streets have to fulfil very strict criteria to cause no perturbation to traffic. In dedicated green spaces, that governance is more flexible but still complex, with multi-layered rules (e.g., heritage regulations) specifying the nature and function of greenery. Ultimately, no exclusive rights are granted to foragers over edibles that remain open access. Within the framework of the planting pilot project in Berlin-Pankow, the right to prune the trees has been extended to anyone willing to do so. It is up to citizens, supported by the Mundraub initiative, to self-organize to ensure this is done properly and promptly. Generally, the practice of urban foraging disrupts the established norm by making it normal for foragers to harvest fruits and take care of edibles, in contrast to a previous perception of urban greenery as mostly ornamental.

Patterns of interactions and outcomes

The results of the data commoning are an unmatched knowledge resource about growing edibles in public space across Germany and in particular in Berlin. Through its map, it communicates an alternative (visual) representation of the urban landscape as an edible space. The map also draws attention to related events that may result in face-to-face encounters. The cost of such a commons lies in providing the infrastructure (programming hours, server hosting, community facilitation). A potential risk (although highly theoretical) is that municipalities might stop tracking the status of their trees in order to save financial resources and ultimately rely on a platform that lacks stable funding sources. When it comes to the commoning of the physical resource, the level of interaction (and its variation) of urban dwellers with the edible landscape is difficult to estimate, as it occurs in the anonymity of public space. The formal governance of edibles remains unchanged in Berlin, apart from Berlin-Pankow where a clear change has happened: The city has allowed by default all citizens to forage without having to file a request, and it is testing the delegation of planting and caring for new edible trees to citizens through the mediation of Mundraub. If successful, the municipality, Mundraub, and other grassroots actors hope to be able to expand the presence of edibles in the urban landscape within the context of

57Ibid.

severely restricted local government resources. The prudence shown by the local administration is attributed, by a city executive, to the perceived risk that citizens' involvement would not last beyond the initial hype, and that newly planted fruit trees would therefore become a financial burden for the city[58]. Nevertheless, the same executive formulated another positive effect of the commoning process as: "[citizens] switch from being like passive customers who just expect something in return for the taxes they pay, to a more active and civic attitude where they feel and act responsibly"[59], which could have positive effects on associated issues such as littering, for example. However, we did not observe any direct synergies with another significant planting project in a different borough, which questions the capacity of Mundraub to embed its action within the existing grassroots networks.

596 Acres, New York City

Background environment

Under New York State's Freedom of Information Law (FOIL), local government has a general obligation to provide citizens access to any public information (excluding special exemptions). Despite this legislation, until 2013 the New York City (NYC) land database (PLUTO) was only accessible by payment of a $1,500 fee for a semester update. In 2013, the 596 Acres initiative submitted a successful FOIL request to access that data free of charge. Shortly after, the database was released as open data through the city's dedicated portal. Onland, the traditionally large amount of vacant land in NYC is the result of the city's fiscal crisis in the late 1970s, resulting in the historical widespread development of community and intercultural gardening, with more than 500 gardens across the city. However, vacant land is now becoming scarce. Remaining vacant public land is often fenced and in a wasteland condition, generally awaiting development by one of the 23 agencies or departments that might own it.

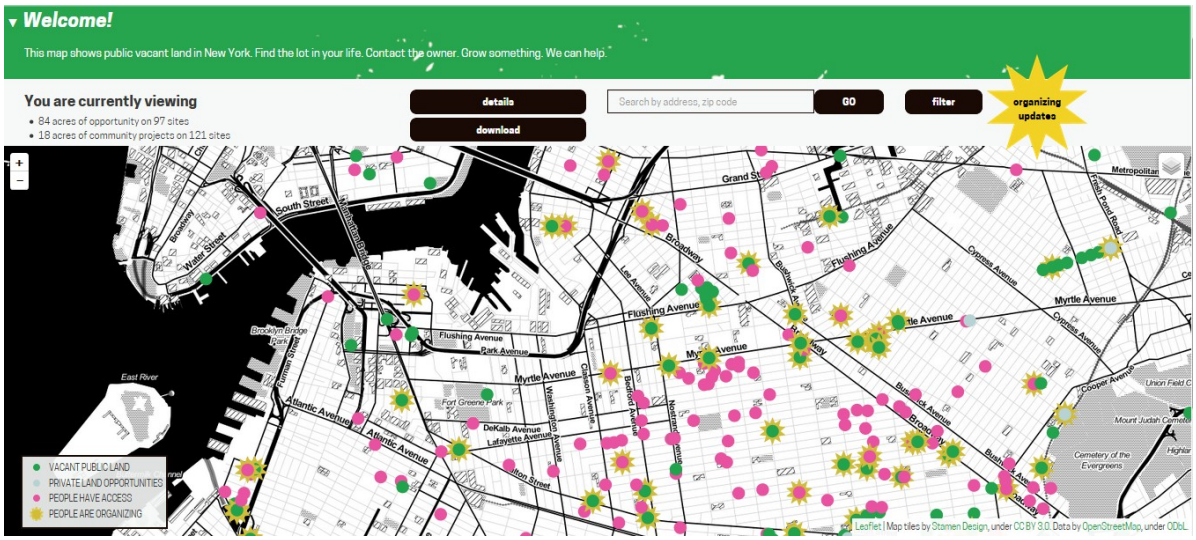


Figure 3: Screenshot of . Points of interest turn into surfaces when zooming in.

Goals and objectives

The main goal of the 596 Acres initiative is to promote community land access in under-privileged neighborhood by reclaiming vacant land. To realize that vision, an intermediary

58Interview in February 2017.
59Ibid.

objective has been the development and maintenance of a comprehensive database of vacant land, including information on ownership, in the form of a participative map (see the Living Lots Map[60] in Figure 3) where people can get in touch with each other and get organized around each PoI (i.e., each vacant lot). The map key distinguishes between vacant public and private land, lots already in the hands of communities, and lots where communities are organizing. The dilemma is to ensure the comprehensiveness and 'freshness' of data, but also its translation into accessible information for a population that is not necessarily digitally literate. The 596 Acres narrative claims that when this enclosed data are made accessible and actionable, this can help local communities regain control of public land in their neighborhood. The main challenge involves encouraging people to self-organize in order to obtain the right to manage a piece of vacant land, and to actually turn it into a functioning and sustainable community space (often a community garden). Overall, the narrative of 596 Acres is that collective access to land "spurs bottom-up development that compensates for uneven growth" (596acres.org, no date) in a city where gentrification is profoundly reshaping the urban landscape and sociology.

Resource characteristics

The data resource is intangible and nonrival. It is derived from open data, completed by the 596 Acres staff, and enriched by the crowd when it is networking online. The online participation infrastructure is provided by 596 Acres in the form of a collaborative map designed to enable direct contact between users and that requires only basic digital literacy. The provision of this infrastructure requires programming skills brought by one of the three members of staff. At the physical level, vacant land is a legacy resource, tangible, and rival. Land values have rocketed in recent years, being highly coveted for private real estate development but also for so-called affordable housing development by the NYC Department of Housing. Gaining access to a vacant lot requires an understanding of municipal rules and procedures. Good social and organizational skills are required to successfully organize a community space (such as an open garden). On both those fronts, citizens can find support through 596 Acres and other actors.

Community attributes

Online, users of the Living Lots map can review data and interact with each other around a given lot — 1882 had done so as of April 2017. Those discussions are visible to any online visitor. 596 Acres' staff provide the online participative mapping platform, curate the open data from various data sets (including updates), and facilitate online participation. Foremost, the staff also activate and support volunteers onland who are willing to set up and self-organize a community space on vacant land. However, speaking of a community around 596 Acres is challengeable. Thus, in the words of one of the founders, "I think this is much more of a network than anything; we do try to feed people into existing communities. There is community garden community in New York that is pretty strong."[61]

Under an agreement with the Department of Parks and Recreation (DPR), most existing community spaces have to guarantee the general public (such as non-participating neighbors) access for at least 20 hours per week during the warm season. Beyond this minimum, each self-organized group is free to restrict and regulate access to the space it manages.

60https://livinglotsnyc.org/ (accessed 05/04/2017).
61Interview in February 2017.

Governance

The local users do not participate in the development process of the participation platform itself (reportedly, there is no demand for it). Nonetheless, the platform employs open source code making it available on a public repository, which is understood as a commons and has been replicated in other cities through partnerships between 596 Acres and other initiatives. Legally, 596 Acres Inc., the infrastructure provider, is a corporation fiscally funded by the non-profit Fund for the City of New York. Online, rules are defined unilaterally by 596 Acres. Users may flag irregular entries, but ultimately the provider has sole power to edit entries according to the website's Terms of Use. Online, the focus of the action arena resides in the disclosure and visualization of data that were previously not open. This later shifted to the meshing of the initial data sets with additional data sets, and the translation of data into simple and actionable information on vacant pieces of land, then directly reaching neighbors whom an online map would likely miss. Overall, there is little actual crowdsourcing of data, and because the Living Lots map data are the result of combining various data sets they are not actually licensed.

Onland, three foci of a larger action arena reaching beyond the sole 596 Acres' activities can be observed. One is around the process of a citizens' group gaining rights to use a vacant lot and formalizing these under an agreement with the relevant municipal department or agency. This may require local coalition-building and advocacy. Another focus is when an existing community space is threatened by a decision of a municipal department. In such cases, intense advocacy takes place and, if successful, may lead to the transfer of the land lot from a department to the DPR to preserve its existence. This happened in 2016, when more than 10 lots occupied by community gardens were transferred from the Department of Housing to the DPR. The last focus of the action arena is the internal level, of self-organizing a community space. Groups have to design their own rules to ensure respect for the formal agreements, to balance diverging interests between members, and to welcome the external public. When under agreement with the DPR, repeated violation of terms may theoretically lead to the dissolution of the space. However, the municipal approach is rather supportive, in particular through Green Thumb, its community gardening program that provides community support, tools, and other gardening materials. Green Thumb oversees the management of more than 500 community gardens across the city without taking part in their governance. While vacant lots are usually fenced and accumulate garbage, community spaces are generally well curated by self-organized groups where the norm is geared towards inclusiveness, openness, and co-production.

Patterns of interaction and outcomes

The commoning of data on vacant land ownership in the form of a map resulted in a comprehensive and open information resource where previously there was only an expensive database used by those who could afford access. This is very valuable for citizens in need of such information, and even sometimes for members of municipal departments who enjoy its accessibility. The networking component of the online platform also enabled active neighbors to meet each other, thereby stimulating the commoning of vacant land. However, it is really the footwork of 596 Acres, based on its treasure trove of information and also benefitting from a supportive municipal and grassroots context for community gardening, that resulted in the creation of 36 community spaces on former vacant lots, which further strengthens the local sense of community. Community gardens

also provide a source of fresh food, although in limited quantity. The costs of community spaces are borne by self-organized groups that volunteer their work and fundraise the resources they need, thereby imposing no burden on municipal finances. However, municipal departments may object to making their vacant land available, on the basis that it has been set aside for future developments that are more financially interesting than community spaces operated by groups who may be unwilling to return the land after temporary use (risk of ossification). The constitution of the online platform and its maintenance was funded through a series of grants and donations.

Comparative remarks and framework evaluation

Both in Berlin and New York, the commoning of data/information resources through a mapping interface functions only as a tool for the commoning of the physical urban space. It is important to note that neither of these local initiatives emphasizes the involvement of their platform users in the governance of the intangible resource (data and platform), as this is not in demand (aside from punctually responding to specific requests). In practice, both initiatives focus all their efforts towards engaging people in making use of the platform and data, contributing to it, and especially towards converting online interactions into action in the physical space — i.e., building an active community of participants. However, 596 Acres seems keener to mesh its activities with the existing grassroots networks of local community gardening, delivering somewhat greater local relevance. It should also be noted that Mundraub promotes a practice (foraging) that has no established community either in Berlin or Germany, and that the group's activities also have a significantly more national profile. The latter may well explain that for Mundraub the continuous expansion of a mostly crowdsourced data commons remains an important goal for scaling the practice and extend the community beyond its first locations of adoption. Conversely, relying mostly on open data and focusing its development within NYC (leaving replication in other cities to external partnerships), 596 Acres reached the peak of its data commoning in the first years of operation and then refocused its efforts on footwork towards community-building.

However, in both cases, the main action arena is situated around the use of the public physical space: Where can a group plant trees? Can a group be granted the use of a vacant lot? What rules apply in a community space? The digital dimension of the two commoning processes observed in Berlin and NYC is more of a strategic one, where only the initiatives as organizations (not the participants) are really agents. In contrast, the closer that issues are to everyday practice (foraging, community gardening), the more participants become agents — defending interests, negotiating rules, devising solutions, etc. The addition to Frischmann et al. (2014) of an element addressing the issue of infrastructure provision (Fuster Morell, 2014) proves useful as it opens the door to understanding the city itself as an infrastructure; local government transitioning from a Leviathan form of management to a more enabling/collaborative actor. This happens cautiously in Berlin, with a longer track record in New York City:

> "With increasing participation of the public, the role of city administrators in charge of public land is changing from being simple managers of streets and park to becoming more facilitators, coordinators." An administration leader, Berlin[62].

62Interview in February 2017.

> "We want to make sure those gardens are stable. But we don't intervene in any decision-making, we provide them with templates sometimes. […] What we ask them is to have by-laws or some guidelines, regulations on how they manage the garden. […] Sometimes, when there are conflicts with neighbors for example we facilitate the process, but generally we try to stay away, giving them the tools to resolve the conflict themselves." An administration leader, New York City[63].

DISCUSSION

While regulatory slippage was identified in the early literature as a frequent factor behind the emergence of urban commons, proactive bottom-up initiatives may engage the local state in reframing its role towards a more collaborative attitude supportive of commoning processes. Commoning data may then be used as a trigger for a wider process. In the second part of the discussion, we reconsider the nature of commoning — from describing it as a process to seeing it as a practice.

From regulatory slippage to the collaborative state: Data commoning as a trigger

Foster explains the emergence of commons dilemmas (i.e., the commoning of urban resources) through regulatory slippage resulting in an absence of government management (Foster, 2011). While partly confirming this hypothesis, our results have shown that commoning may also emerge as the result of strategic interventions (i.e., providing actionable information about a tangible resource) that redefine the nature of urban resources (e.g., a fenced vacant lot) that were less subject to receding public management, than they displayed unexploited potential to entrepreneurial citizens. Thus, the activation of public space may radically change its function and nature through the emergence of commoning initiatives (Radywyl and Biggs, 2013). This has been shown in notable empirical examples of self-organized WiFi networks in Spain[64] and Germany[65] that gave rise to a new urban commons: free Internet access. Generally, the local state may play a critical role (as participation infrastructure provider) in enabling collaborative management of urban resources, as shown in other cities such as Bologna (Foster and Iaione, 2015). This trend towards municipalities as a local emanation of the collaborative state (Foster and Iaione, 2015) is linked to a phenomenon uncovered in our cases studies.

Confirming the idea that open data makes government more porous (Bollier, 2016, p. 16), our results have shown exactly that: When data are available and made actionable for the lay citizen, this can function as a trigger for commoning practices that do not fit within traditional government categories. Based on our findings, the further replication of such synergy may require three things. Firstly, that local governments make their data available in accordance with good practice principles: This is an ongoing trend embodied by the open data movement, resulting in the public release of thousands of municipal data sets globally, as shown by the Global Open Data Index survey (Open Knowledge, no date). When initiatives rely on crowdsourcing data, the fact that no particular equipment is required to collect data greatly helps adoption. Secondly, it requires the existence of civic actors (grassroots organizations, hackers, social/civic entrepreneurs) that have the skills

63Interview in February 2017.
64Guifi.net in Spain counts more than 33 000 nodes. Source (accessed 12/05/2017).
65Freifunk in Germany counts more than 300 local communities, with some (e.g., Freifunk Münsterland) having more than 3000 access points. Source: (accessed 26/04/2017).

and organizational capacity to shape raw data into constantly evolving information product(s) — such as dedicated mappings — that remain actionable in the context of a living commoning practice, performing a political discourse about the city as seen in other initiatives such as the Smart Citizen Kit[66]. Thirdly, our cases demonstrate that greater impact in the city is achieved through the activation of local communities; online mapping, as performative as it is, remains a trigger and requires onland action to realize its full potential in commoning the city. With those three conditions it seems that cities may well "find data-driven ways to embrace the power, flexibility and conviviality of the informal economy" (Bollier, 2016, p. 18).

Beyond the IAD framework: Departing from a naturalist conception of the commons

In framing the case study findings, our adaptation of the IAD framework is helpful in emphasizing the dilemmas and challenges specific to different types of resources, but it raises three issues. Firstly, it creates artificial boundaries between intangible and tangible commons, online and offline communities, whereas in practice there is only one process of community building and collective action deploying itself onland. Secondly, it linearizes an organic process in which accidents, opportunities, and idiosyncrasies play a central role. Thirdly, the framework does not explain the central challenge of building a lasting local community. Indeed, it over-emphasizes the process around the constitution of a data commons that in practice involves very few actors and is simply a strategic trigger for a more complex onland process.

Our critical evaluation of the IAD (see Results) finds resonance in the literature on commoning and urban commons. Thus, for Bresnihan (2016, p. 94), "While the distinction between the material/natural commons and the immaterial/social commons can be analytically helpful it tends to be over-stated, obscuring the continuity and inseparability of the material and the immaterial, the natural and the social." That tension is particularly well revealed in our cases, where commoning practices so obviously blend together the commoning of intangible and tangible resources. It is argued that focusing on *resources* and a connected *process* tends to 'naturalize' a reality that is largely social and complex (Bresnihan, 2016, p. 93). This critique of a naturalist understanding of the commons transported by Ostrom's epistemology finds its source among feminist scholars (Federici, 2001; Shiva, 2010) and geographers (Blomley, 2008; St. Martin, 2009) for whom the commons was never a resource. Commoning — the verb form emphasizing the shift away from an ontological divide between object and subject (Bresnihan, 2016) — is a living process (Bollier and Helfrich, 2015), or more accurately a social practice (Harvey, 2012): "the commons […] is only ever constituted through acting and doing in common." (Bresnihan, 2016, p. 96). Such an ontological shift towards representing commoning as a practice is necessary to perform an ontology of the city in which smart citizens, not the smart city, are the subjects.

This is not just a rhetorical argument. Conceptually separating data from the various realities (physical, social, etc.) in which it is embedded is largely performative of a narrow neoclassical vision of the urban (economy) that eludes, for instance, questions of power in the engineering of information systems. To that extent, using the IAD framework slightly contradicts our intention to position the present research as a performative ontological

66https://smartcitizen.me/kits/ (accessed 11/05/2017).

intervention of documenting an alternative urban reality (Gibson-Graham, 2008, p. 614). We are left with, on the one hand, a framework that shows analytical power in substantiating the materiality of commoning the city and, on the other hand, its epistemological shortcomings. In that context, we argue, that a shift towards documenting the *practice* of urban commoning while integrating analytical elements of the IAD is meaningful. In that respect, two theoretical backgrounds can be envisaged. Institutional Work is rooted like the IAD in Institutional Studies and is a perspective that seeks to uncover the internal life of processes by documenting practices: i.e., the work of actors shaping, creating, maintaining, and disrupting institutions (Lawrence and Suddaby, 2006, p. 216). While it may be a good counterbalance to IAD's focus on process, it is rooted in the same epistemological tradition. In contrast, the endeavor of Bollier and Helfrich (2015) to use the concept of Christopher Alexander's pattern language (1977) to capture the principles and inner dynamics of self-organization that are left unaddressed by the IAD framework allows for an epistemological rupture by considering commoning holistically.

CONCLUSION

Commoning data is a political and performative intervention that finds its full meaning when it is understood as one facet of a wider commoning practice of the city. As we suggested by our use of the adverb onland, the separation between digital/online and local/offline makes no more sense than if we were to separate tangible and intangible resources in analyzing the commoning of the city. Moving away from a naturalist ontology of the world allows us see that, more than documenting a process of reclaiming urban resources, researching the phenomenon of commoning the city is about uncovering a living *practice* of collaboratively producing a shared experience of the place, whether by picking apples or agreeing on their location. We identified that, for such a practice to unfold, the provision of an infrastructure that enables participation is key — be it an online map, a physical space, or a supportive regulatory environment. Further (action) research is needed to co-design (Manzini, 2015) and uncover other occurrences of hybrid commoning as a *practice* — rather than process — and the role of infrastructure providers.

Ultimately, we do not pretend that these two cases are in any way representative of a widespread bottom-up practice. However, they show innovative and promising avenues for improving citizens' agency over urban space. Following Gibson-Graham (2008), it is argued that documenting such marginal phenomena can contribute to making them more real and credible for policy and activism, contributing to considering alternatives to the smart city narrative.

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6.3 Article 3

Article

Sharing Cities and Commoning: An Alternative Narrative for Just and Sustainable Cities

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Abstract: Sharing Cities are emerging as an alternative narrative which promotes sharing as a transformative phenomenon for just and sustainable cities. This article shows that Sharing Cities are conceived within the alternative political economy of the commons. Bringing a theoretical contribution into dialogue with a practice-oriented book, this paper aims at checking the concept of Sharing Cities against the reality on the ground, by reviewing 137 secondary cases: (1) Is communal (non-commercial) sharing a substantial phenomenon? (2) What is the role of technology – and more widely, of intermediation – in sharing practices? (3) If at all, what is being transformed by sharing practices? (4) Are commons depicted in each case? Results show that most cases display a communal form of sharing that is independent of digital platforms; i.e. that the sharing transformation affects all arenas of production and social reproduction across a wide variety of sectors, and relies on translocal replication rather than up-scaling. With only 26% of cases apparently depicting a commons, the paper argues for a relational epistemology of urban commoning, shifting the focus to more-than-human commoning-communities. Thus, Sharing Cities are captured not only as a set of policy proposals and practices, but as the performative depiction of an alternative worldview based on interdependence, ready for the Anthropocene.

Keywords: Sharing Cities; Sustainability; Commons; Commoning; Smart Cities; Digital Technology; Case Study Review; Grassroots Innovation; Anthropocene

1. Introduction

The Sharing Cities approach is emerging as an alternative to the smart city discourse on the opportunities created by digital technology at the intersection of cyber space and urban space (McLaren and Agyeman 2015; Longhurst et al. 2016). At a time when urban settlements are seen as the locus of the sustainability challenge, (Bulkeley 2010; UN-HABITAT 2009; OECD 2010) it is argued that cities – through population density and a highly networked urban space – provide critical mass in both demand for, and supply of, shared resources and facilities (McLaren and Agyeman 2015). With the rise of digitalization, so-called sharing economy online platforms that enable collaborative consumption and production are also reshaping urban economies (Davidson and Infranca 2016). Boyko et al. (2017) argue that the sharing economy presents a very narrow view of the potential of sharing to contribute to more sustainable cities. In contrast, the Sharing Cities discourse includes, but also transcends, the sole sharing economy approach, acknowledging that in cities, both commercial and communal forms of sharing may coexist (Boyko et al. 2017; McLaren and Agyeman 2015). The Sharing Cities narrative has also been identified as an emerging counter-narrative to the neoliberal imagery of urban development (Longhurst et al. 2016). With Sharing Cities, Duncan McLaren & Julian Agyeman (2015) argue that a "sharing paradigm" rooted in the political economy of the commons – beyond market and state – can be a transformative force for more just and sustainable cities.

In 2018, the non-profit online media platform, shareable.net –"A valuable ally in our evolving thinking" (McLaren and Agyeman 2015, p. 18) and catalyzer of the Sharing Cities movement (Sharp 2018) – released its own Sharing Cities publication (Shareable 2018): a practice-oriented book fleshing out the alternative narrative with a collection of 137 short case studies depicting local bottom-up initiatives and policies. It adds to preliminary mappings of sharing in cities executed in specific locations (Boyko et al. 2017).

Notably, both publications have anchored their narrative of Sharing Cities in the political economy of the commons. This concomitance provides a unique opportunity to map a broad scope of field practices in the light of the analytical frames proposed by McLaren and Agyeman (2015) and get a clearer view of what this emerging Sharing Cities narrative is made of. Thus, in this paper, we review the case studies assembled by Shareable and its collaborators, using McLaren & Agyeman's approach.

1.1. Rooting the Sharing Cities discourse in the political economy of the commons

The sharing paradigm as proposed by McLaren & Agyemann (2015) is based on an understanding of well-being that requires building and developing human capabilities for all. According to the authors, "the fundamental resources we have available to do that […] are better conceived and understood as shared commons than as private goods" (McLaren and Agyeman 2015, pp. 8–9). This centrality of the commons as a form of economic organization in the Sharing Cities narrative has also been identified elsewhere (Longhurst et al. 2016). Consistently, Shareable's *Sharing Cities* ambition is to dissipate the "blindness" to people's power to meet their needs outside of the market and state, through the commons (Shareable 2018). Following Elinor Ostrom (2007), it is less about seeing the commons as a new panacea for urban development, than bringing back the three spheres of market, state, and the commons into balance and harmonization, with each one controlling the excesses of the others (Shareable 2018). It answers a concern that much of the sharing economy literature frames sharing only as an economic activity, rather than a social, cultural or political one that is rooted in urban environments (Boyko et al. 2017; Arnould and Rose 2016; McLaren and Agyeman 2015). To reflect this diversity, McLaren and Agyeman (2015) propose that the sharing paradigm can be mapped on a continuum between commercial and communal sharing.

Under the commons paradigm, a sharing city is not only about the right for urban dwellers to use shared resources and infrastructure, but, fundamentally, a right to remake cities (McLaren and Agyeman 2015; Harvey 2012). Thus, in her seminal work, Elinor Ostrom outlined a series of eight conditions for a successful governance of the commons including the rights of individuals affected by a resource regime to participate in making and modifying its rules (Ostrom 2009). Another condition is that this right of the citizens to make rules directly is recognized by the government (Ostrom 2009); a condition that is generally not met in the urban context but which can change, as illustrated by the pioneering city government of Bologna in Italy, where a law was passed to create opportunities for citizens to be directly engaged in the management of urban commons (City of Bologna 2014).

The implementation of the sharing paradigm calls for socio-cultural and political changes (McLaren and Agyeman 2015). Thus, by rooting the sharing paradigm in the urban space and its politics, the sharing cities narrative may avoid "the post-political trap" (McLaren and Agyeman 2015) of utopian discourses such as Rifkin's vision of a zero marginal cost society (Rifkin 2014). In this line, the sharing city approach may have strong commonalities with the municipalist movement in Spain that has often used the concept of commons as a central element of local political platforms, such as Barcelona's En Comú. Indeed, "the conceptual flexibility and diversity of understandings of the term [commons] offers the hegemonic potential of serving as a cornerstone for a political project that, on the one hand, rejects neoliberal privatization, and, on the other, refuses to fall back into the kind of monolithic understandings of the public/the state" (Rubio-Peyo 2017, p. 21).

1.2. The problematic role of (digital) technology

One of the stated aims of McLaren & Agyeman's *Sharing Cities* book is to show how "truly smart cities must also be sharing cities" (McLaren and Agyeman 2015, p. 2). Indeed, the smart city discourse has been largely criticized by observers and academia for imposing on local governments and their citizens a technocratic and market-driven vision of city governance (Kitchin 2014; Sennett 2013; Townsend 2014). McLaren and Agyeman (2015, p. 5) want to redefine smart cities as a way of "harnessing smart technology for an agenda of sharing and solidarity, rather than one of competition, enclosure, and division". However, they do not restrict sharing to practices using (digital) technology and present in their sharing paradigm a continuum between inter-mediated forms (through a third party such as using an app or similar) to informal or socio-cultural sharing (with no third party involved, such as sharing between friends, neighbours, etc.) (McLaren and Agyeman 2015). This is a major distinction from the usual sharing economy literature that gives a defining role to digital technology as a key enabler for collaborative consumption and production (Hamari et al. 2016; Botsman and Rogers 2011; Richardson 2015).

Rather than with technology per se, they see the key issue lying with the distribution of power around the organizations using such technology (McLaren and Agyeman 2015, p. 118). However, while power is certainly a core issue, it has been argued that (digital) technology is a problematic category in itself (Kitchin 2014; Morozov 2013). Thus, Kitchin (2014) and Gitelman and Jackson (2013) have shown that data – the core resource of mainstream smart cities – is never raw, never neutral. Morozov (2013) argued that algorithms – the core technology to process data – are bound to present shortcomings or biases. It appears that the problem with technology does not only lie in the power structures surrounding its use, but also in the wider political-economic context it is embedded into (March 2016). Thus, the smart cities narrative has also been characterized as an overly techno-optimist vision (Söderström et al. 2014; Morozov 2013). It is therefore necessary to problematize technologies that are heavily shaped by commercial or state actors, and the potential contradictions that may appear in their application to enable commons-oriented initiatives and practices. Also worth considering, is that sometimes a certain "penchant for technological solutionism", as put by Morozov (2013) may drive observers to overestimate the role of technology above the importance of community-based actions in commoning processes and practices, even when they partly rely on the use of digital tools (Labaeye and Mieg 2018).

Spanish municipalist governments such as Madrid and Barcelona are at the political vanguard of the movement to reclaim the urban digital infrastructure. Thus, in Madrid, an open-source platform (decide.madrid.es), launched in 2014, enables citizens to submit and select projects to be funded under the participatory budgeting process (Rubio-Peyo 2017). As shown by Rubio-Peyo (2017), through the generalization of open data and open source software for all city operations, the municipality of Barcelona has locally redefined the notion of "smart cities", away from what Kitchin pointed as "an underlying neoliberal ethos" (Kitchin 2014). This echoes efforts to redefine technology away from productivist capitalism: thus, an "appropriate technology" is owned by the local community (Hazeltine and Bull 2003). With the digital transformation, this has naturally found a declination as open source appropriate technology (Pearce 2012). It is unclear what role such alternative technology has, and under which concrete form it may play in Sharing Cities.

1.3. The transformative power of sharing

Referring to Shareable's founder Neal Gorenflo, Ede (2014) and McLaren and Agyeman (2015) show that beyond transactional sharing, which is of mostly economic nature and focused on improving efficiency of asset use and cost-sharing, transformational sharing involves a shift of power and social relations; it emphasizes solutions that build residents' ability to work together (Shareable 2018). Thus, they argue that the intangible benefits of transformative sharing are potentially of greater significance than the tangible ones resulting from transactional sharing (McLaren and Agyeman 2015, p. 255). For Sharp (2018), transformative sharing as promoted by Shareable since 2013 through the Sharing Cities network is based on community empowerment and grassroots mobilization, qualifying as a transformative social innovation (Haxeltine et al. 2016). The latter is defined as a "social

innovation process that challenges, alters, or replaces existing institutions and institutional arrangements *across* the context (i.e. in more than just a single isolated social experiment)" (Haxeltine et al. 2016, p. 11). By many accounts, the sharing paradigm deployed in cities by McLaren & Agyeman or Shareable proposes to transform institutions along the whole spectrum, from somewhat private interactions to municipal rules: "In conclusion therefore, as we understand it, sharing offers both a sustainable foundation for participatory urban democracy and a transformative approach to urban futures." (McLaren and Agyeman 2015, p. 322)

To analyze the scope of such a transformation, McLaren and Agyeman (2015) refer to Harvey's (2011) seven arenas [norms, rules, values, etc.] in which neoliberal capitalism – or, alternatively, the sharing paradigm – shapes life: forms of production, exchange and consumption; relations to nature; social relations between people; mental conceptions of the world, embracing cultural understandings and beliefs; labour processes; institutional, legal, and governmental arrangements; and the conduct of daily life that underpins social reproduction (Harvey 2011).

A main rupture with the sharing economy approach, and a core feature of the Sharing Cities discourse, is to advocate for extending the sharing paradigm beyond mere bike-sharing schemes and other accommodation policies for Airbnb, to the whole city as a system in all its dimension, including financial, institutional and cultural ones: "We suggest that "sharing the whole city" should become the guiding purpose of the future city" (McLaren and Agyeman 2015, p. 5). This idea echoes strongly the work of Foster and Iaione (2015) who have suggested reconceiving "the city as a commons" by transforming the role of the local state from one of a regulator, to one of a facilitator of citizens' direct involvement in the governance of shared assets and municipal services. They argue that the city is a commons by virtue of its openness, resulting in a potential for rivalry as well as producing collective wealth (Foster and Iaione 2015). In that context, "sharing" – similarly to "commoning" – is understood as a third way of governance and provision, rooted in the collective governance of jointly held resources (McLaren and Agyeman 2015, p. 14).

In their introduction McLaren and Agyeman (2015) stated the ambition to show how a broad understanding and implementation of sharing can overcome the shortcomings of commercial approaches and transform our understanding of sharing and cities. While substantiated with empirical evidence it is mainly a theoretical effort. In turn, the motivation of Shareable's *Sharing Cities* book, is to bring the already existing pieces of the puzzle together so that the sharing city becomes a more concrete vision (Shareable 2018). How far do those empirical elements substantiate or contradict the conceptual approach laid out by McLaren and Agyeman (2015)?

2. Research questions

To explore this main line of investigation, four questions are emerging.

McLaren and Agyeman (2015) stressed the importance of communal (community-oriented) sharing as a transformative force. On that basis, how much communal, as opposed to commercial, sharing practice is there in the field? Given that Shareable's (2018) collection of cases was also motivated by drawing attention to commons-oriented initiatives, it is reasonable to hypothesize that a large share of the cases to be reviewed will, indeed, depict communal sharing practices.

It has been shown previously that while sharing is often associated with the emergence of digital technologies, the sharing cities approach also includes practices that are not inter-mediated online. To gain a clear view of the role of digital intermediation in the Sharing Cities narrative, this article investigates how cases are distributed along the inter-mediated/socio-cultural continuum. From Shareable's focus on people as key actors, it can be expected that technology is playing a less important role in the sharing cities discourse than in the sharing economy, where the online platform is generally accepted as a defining feature (Hamari et al. 2016; Botsman and Rogers 2011).

Using the sharing spectrum laid out by McLaren and Agyemann (2015), this paper will investigate what domains are impacted by sharing practices and policies: in other words, what is being shared? Is the scope of transformation as broad as it is suggested? The literature review showed that it may well be so, shifting our view of city governance beyond sole consumption and production

processes usually depicted in the sharing economy literature. However, the degree of commitment required at the political level of city governments to engage in integrated processes such as in Seoul, Bologna or Barcelona suggests that it is unlikely that many cases or policies will depict a cross-sector change in formal legal and governmental agreements. Therefore, it is expected that most cases have an impact – if at all – in narrow fields of policy, and, possibly, on "soft" institutions such as norms and values.

McLaren and Agyemann (2015) emphasize that key urban resources are better conceived of as commons than private goods. The transformation in the governance of urban resources towards community-managed commons is therefore critical to the Sharing Cities narrative. But on the ground are such urban commons already a reality? In the introduction to Shareable's book Gorenflo warns that few cases are "purely commons oriented", some only have commons elements, while others just set the stage for commons development (Shareable 2018, p. 29). To assess the empirical relevance of urban commons as key building blocks of the Sharing Cities narrative, it appears critical to check whether an actual commons – a set of relations between a resource, a community, and rules – is being depicted in each case.

3. Methodology

In this paper, the 137 cases and policies compiled in Shareable (2018) are reviewed using two main analytical representations proposed by McLaren and Agyemann (2015) to navigate the field of sharing cities as well as insights from the commons literature. Some degree of subjectivity is inevitable in the analysis of the limited material at hand in scoring and sorting the cases. To limit this, research questions are operationalized through concrete closed questions, in particular in investigating the sharing paradigm. Although not purely positivist, I believe this review provides a useful basis to discuss the narrative of Sharing Cities and its rooting in existing practices.

3.1. Mapping the sharing paradigm

One such tool is a mapping of the *sharing paradigm* (Figure 1) along two axes into four "flavors of sharing". The horizontal axis represents the continuum extending from inter-mediated (i.e. through platforms or third parties) to socio-cultural sharing, and, on another axis, the contrasting poles of commercial and communal sharing (McLaren and Agyeman 2015, p. 13). The authors stress that this characterization is a gradual one and speak of four "flavors", graduations of sharing combined as in Figure 1.

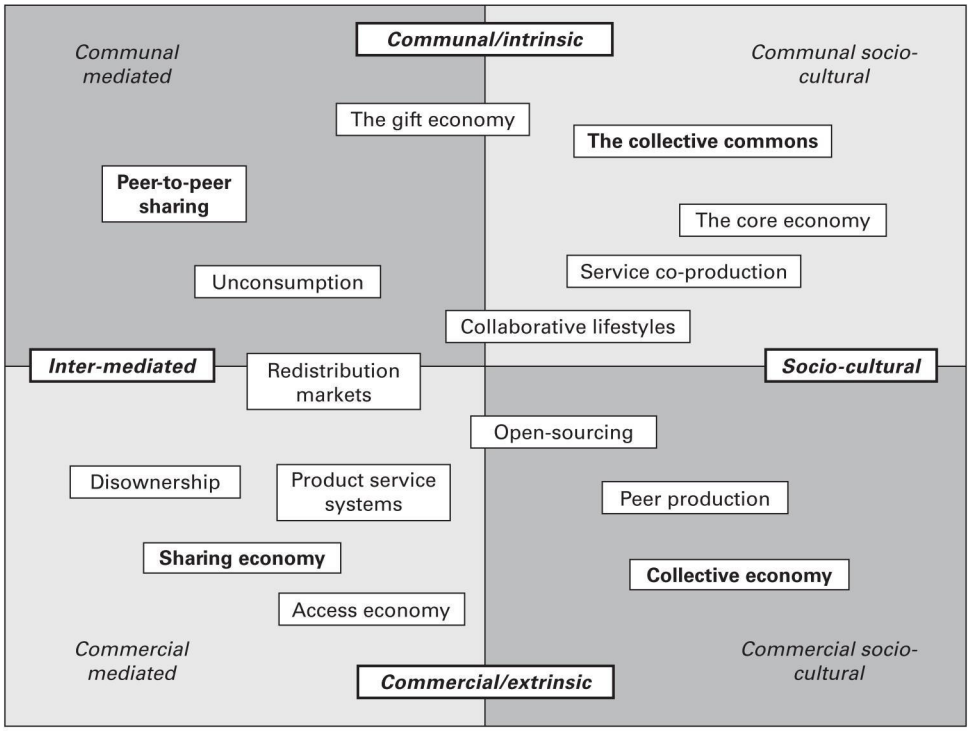

Figure 1: Key dimensions of sharing, (McLaren and Agyeman 2015)

To reflect the gradual nature of this classification the present review sorts the cases along two axes with a simple scoring. The horizontal axis contrasts Inter-mediated (on the minus side) vs. Socio-cultural (on the plus side) practices. The vertical axis sets Commercial on the minus side and Communal on the plus side. This coarse scoring intends to show some contrast in the degree of which initiatives display the various attributes ("flavors"). It is operationalized by asking for each dimension (corresponding to an axis) four questions that build upon the developments of McLaren and Agyemann (2015). Each "yes" scores +1, each "no" scores -1, except for the first and main question for each dimension, where the score is doubled to ensure appropriate contrasting.

> *"On one dimension we see a contrast between sociocultural or informal sharing (typically between family members, friends or neighbors, directly organized by the participants in line with social norms) and (inter)mediated sharing, which is mediated through a third party (often using a website or mobile application)." (McLaren and Agyeman 2015, p. 14)*

Thus, for the horizontal axis inter-mediated/socio-cultural, the questions are the following: (1-main question) is the sharing practice socio-cultural (i.e. happening without going through an external third party, requiring digital platform or not)? (2) Is the sharing practice possible without using a *digital* platform? (3) Are the shared resources co-owned by the participants themselves? (4) Is the sharing practice the result of a co-evolved tendency shared by a group (rather than a learned behavior/replicated initiative)?

> *"The other dimension is about why we share, and the motivations of the participants. On this second axis we map a contrast between typically extrinsic motivations, notably commercial gain; and intrinsic motivations based in a sense of community, which we label as the commercial–communal axis." (McLaren and Agyeman 2015, p. 14)*

For the vertical axis of commercial/communal, the questions include: (a-main question) Is the initiative/practice mostly intrinsically motivated: i.e. based in a sense of community rather than commercial gain? (b) Are profit-oriented/commercial activities completely excluded from the practice

itself ? (c) Is the practice free of monetary transactions? (d) Are the participants involved in some sort of self-governance (e.g. co-shaping the rule/norms applying to the practice)?

This analytical tool can only be used to review half the cases (69 out of 137): i.e. those portraying initiatives that depict a sharing practice, and not public policies that present regulations, decisions, strategies, etc.

3.2. The sharing spectrum: what is actually being shared?

Going one step further to substantiate their argument that sharing is transformative, McLaren and Agyemann (p.255) propose a tool to map the *sharing spectrum* (Figure 2) according to the domains where sharing is deployed (i.e. what is shared), from more tangible domains to more intangible ones. It connects these "sharing domains" to Harvey's (Harvey 2011) arenas of production and social reproduction where *sharing* may result in changing norms: "forms of production, exchange and consumption; relations to nature; social relations between people; mental conceptions of the world, embracing cultural understandings and beliefs; labor processes; institutional, legal, and governmental arrangements; and the conduct of daily life that underpins social reproduction" (McLaren and Agyeman 2015, p. 13).

Sharing domain (what is being shared)	Concepts	Examples	Arena(s) where this may change norms
Material *Tangible*	Industrial ecology	Circular economy, recovery and recycling, glass and paper banks and collection, scrapyards	Relations to nature; forms of production, exchange, and consumption
Production facility	Collaborative production	Fab-labs, community energy, job sharing, open sourcing, credit unions, and crowdfunding	Forms of production, exchange, and consumption; labor processes
Product	Redistribution markets	Flea markets, charity shops, Freecycle, swapping and gifting platforms	Forms of production, exchange, and consumption
Service	Product service systems	Ridesharing, media streaming, fashion and toy rental, libraries	Forms of production, exchange, and consumption; labor processes; conduct of daily life; social relations between people
Experience	Collaborative lifestyles	Errand networks, peer to peer travel, couchsurfing, skillsharing	Conduct of daily life; conceptions of the world; social relations between people
Capability *Intangible*	Collective commons	The Internet, safe streets, participative politics, SOLEs, citizen's incomes	Conceptions of the world; social relations between people; institutional, legal and governmental arrangements

Table 1: The Sharing Spectrum (McLaren, Agyeman 2015, p. 254)

It is deemed that the self-explanatory nature – thanks to the examples – of this analytical tool does not require any further operationalization step and can be used "as is" to review cases and policies.

3.3. Identifying a commons

In addition to the domains impacted by sharing, it is of interest to explore whether general sharing actually translates into the community-governance of resources: i.e. commons. Thus, as Gorenflo mentions in the introduction of Shareable's book, not all cases presented are depicting a clear-cut commoning practice:

> *"For instance, there are few cases and policies that are purely commons-oriented. The majority of the pieces have a commons element, and the rest arguably set the stage for commons development. For instance, Barcelona's Solar Thermal Ordinance (Chapter 5) helps to localize renewal energy production, setting the stage for a commons approach to energy, but doesn't imagine a commons in its effort to promote sustainability." (Shareable 2018, p. 29)*

This ought to be reviewed in more detail in order to obtain a more precise notion of such proportions, with the aim of informing observers of the actual role of commoning in the Sharing City approach. Taking inspiration from Ostrom's definition (Hess and Ostrom 2007, p. 3), so-called "purely commons-oriented" cases will be those where a clearly identified resource is being shared by a group of people who manages it collectively, through a set of rules, beyond state governance or market mechanisms. Nevertheless, commons are also increasingly described as the relational social framework formed by the resource, the community and the rules (Bollier and Helfrich 2015). Therefore, when either a shared resource, a collaborative practice, or a community is present (i.e. not at the same time), cases will only account as "having a commons element". All other cases will be categorized as "setting the stage for commoning", following Shareable's authors, although this might be a matter of contention.

4. Results

4.1. Some geographical considerations

The book features cases from every continent, although none from South-East Asia, China, Middle-East, North Africa, or Russia. In many of those places, state control over the economy and the civic society remains tight. Some cities often come back into focus. Thus, cities that are often described as hot places of the sharing movement such as San Francisco (5 cases), Seoul (4), Barcelona (4), and perhaps more surprisingly London (5) and New York (4) that are usually more known as financial centers. Portland (4), Hamburg (3), and Helsinki (3) are also noticeable. As it could be expected given a largely Western authoring team, out of 137, 44 cases are located in Western Europe while 42 are in the US and Canada. Although the US-Canada and Western Europe are dominant, it is worth appreciating that they both amount to 62% of the cases, giving ample representation to other areas of the world such as South Korea, India, South Africa, Brazil or Australia. It is fair to say that Sharing Cities are a global phenomenon.

4.2. Mapping along the four "flavors" of the sharing paradigm

The "four flavors of sharing" explore the dimensions of intermediation and motivation that drive the practice. Thus, out of the 137 cases contained in the book, the 67 policies do not qualify for assessment here as they do not depict a sharing practice. Although they were contained in the initiatives' section of the book, three additional cases were excluded from the analysis as they do not qualify as a sharing practice where one could answer the rating questions; these are the Stop Wasting Food Campaign (Shareable 2018, p. 172), Pittsburgh Community Bill of Rights banning fracking

(Shareable 2018, p. 186), and Bologna's Regulation on the Care and Regeneration of the Urban Commons (Shareable 2018, p. 252). Here, the sample size is therefore reduced to 66 cases.

As seen in Figure 2, sharing cities as they are described by Shareable are covering a set of practices that is largely communal (86% of the cases that are not policies). Nevertheless, the degree of communality varies, and cases spread rather evenly along the communal dimension. Cases scoring 3 usually answered negatively to question (c) ("Is the practice free of monetary transactions?") or (d) ("Are the participants involved in some sort of self-governance"?), and all but two completely exclude profit-oriented activities. Interestingly, five out of the nine cases that score negatively on the vertical axis, and therefore having a rather commercial flavor, are actually rated as intrinsically motivated cases (in reference to question a). This leaves very few cases (4) where the main motivation is commercial rather than being rooted in a sense of community. Three of those are co-operatives, where ownership is shared between workers or investors. Consistently, with its introductory statement that "the commons needs to be elevated to a dramatically higher level of importance in urban development" (Shareable 2018, p. 32), the selection of cases by the authors of the book has clearly favored a communal orientation for fleshing out what a sharing city can be. To nuance this assessment from a methodological level, it is useful to note that seven cases reviewed scored low (y=1) on the communal-sociocultural quadrant (x>0;y>0). Examples range from collectives of social or cultural entrepreneurs to FabLabs and a wind-energy cooperative, examples where a soft commercial orientation is combined with a clear community purpose. These examples do give a taste of what socio-cultural and commercial sharing look like, although they are situated in the communal half of the quadrant.

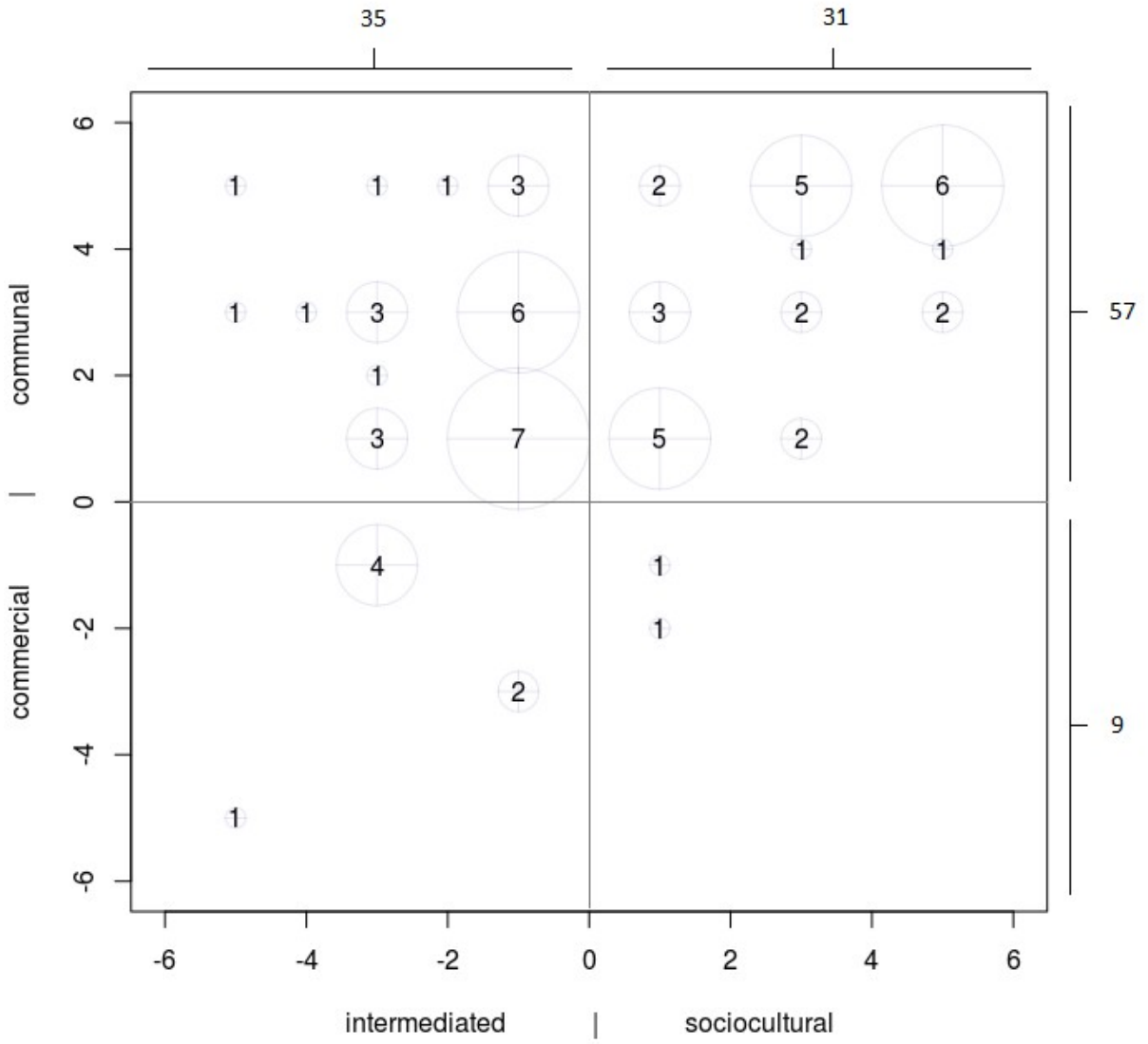

Figure 2: Graph representing the dispersion of the cases across the sharing paradigm (the number indicating the number of cases for each pair of coordinates; n=66)

Over half the (eligible) cases (35) display some degree of third-party intermediation, and this even in initiatives with a communal flavor. However, only a third of them use some sort of digital platform (23 cases out of 66). This tends to depict a different reality to a sharing economy that solely focuses on digital technology as a key enabler. In addition, when there is intermediation, it is low. From the material analyzed, intermediation can generally be found in two types of cases. On the one hand, a third party may be necessary to organize a relatively complex service and/or requiring a significant infrastructure. This applies in the case of Humanitas (Shareable 2018, p. 40), a senior housing project that also offers housing to students in exchange for volunteering with older people, or Regionalwert AG (Shareable 2018, p. 234), a cooperative investment fund for sustainable local food. Here an organization takes over the coordination of a complex new service (Regionalwert AG) or integrates sharing into an existing service (Humanitas). On the other hand, a third-party provider may be an instrument to scale up a practice. Thus, Freifunk (Shareable 2018, p. 208) offers the platform and open source resources across Germany for local groups to develop their own alternative internet infrastructure. Using an online platform, CoAbode (Shareable 2018, p. 46) matches single mothers for sharing flats and help with daily life across the US. Interestingly, when over half of the

cases (34) are the result of coevolution by a (local) group – i.e. not a scaled-up practice – 21 of these practices are still happening through a third party. In fact, 70% (46) of the cases involve a third-party. Therefore, sharing practices that are more sociocultural are a minority. Among various other reasons, an intermediary organization – an association or a cooperative – is often required for legal aspects, such as co-owning assets or managing liabilities.

Three clusters can be described. One covering cases that have a high degree of communality and are highly sociocultural. Such cases are Walking School Buses (low tech mobility solution), 596 Acres (reclaiming of vacant land for community purpose), Repair Cafés (repair self-help communities), Tarun Barat Sangh (community-led water management), Resident Development Committees (community-led water management), depave (community-driven removal of impervious pavement), Incredible Edible (guerilla urban gardening), Les Murs à Pêches (cultural event for community activation), Bottom Road Sanctuary (self-governed nature reserve), Chisinau Civic Center (reclaimed land for community purpose), Water management beyond politics (historical governance structure), Neighboorhood Partnership Network (residents empowerment in planning), Club of Gdansk (multi-stakeholder forum for planning). Notably, four of these are involved with sharing that pertains to land, and four others are related to water. Another cluster appears around the center of the graph with a light intermediation flavor and rather communal orientation. Examples are: Humanitas (students co-living with seniors), Opportunity Village Eugene (transitional housing for homeless people), Miethäuser Syndikat (co-housing supporting organization), Seva Café (pay-it forward restaurant), Evergreen, Library at the Dock (maker space in public library), Platform Co-op (cooperative model for sharing platforms), Community purchasing alliance (pooling purchasing power), Human Ecosystem Project (reclaiming social media data), ShareHub (online information platform about sharing), RegionalWert AG (cooperative investment fund for local food), Nippon Active Life Club (time banking for seniors), Liquid Feedback (digital decision-making tool). A third smaller cluster, in the lower left quadrant, can be described as having medium intermediation and a low commercial flavor. Three of these are about mobility: SafeMotos (addressing safety in mototaxi business), Multimodal Toolkit (encouraging multimodal mobility), RideAustin (not-for-profit ride-hiring app); one about waste: Warp It Reuse Network (interorganizational marketplace for surplus office furniture and supplies).

With only two cases – COOP Taxi in Seoul (Shareable 2018, p. 64) and Compost Pedallers in Austin, Texas (Shareable 2018, p. 166) – sharing that is both socio-cultural and commercial (open sourcing, peer-to-peer economy) barely appears in the book. Again, the fact that the book largely focused on commons-oriented approaches may explain this. But, the absence of a now widespread practice such as coworking raises questions on how much existing and substantial evidence of this sharing flavor is missing from the picture of a Sharing City drawn by Shareable in its book.

4.3. What is being shared? Review of sharing domains along the sharing spectrum

Sharing domain Book chapter	Material	Production facility	Product	Service	Experience	Capability
Housing		7		1	4	1
Mobility		1		9	1	2
Food		2	8		2	4
Work		10	2	3		7
Energy	2	7				3
Land		9			1	2
Waste	2	3	3			4
Water		2				10

Technology	5	1		4		
Finance		11				1
Governance		1				12
TOTAL	13 (9%)	50 (36%)	14 (10%)	16 (12%)	9 (7%)	45 (33%)

Table 3: Sharing domains – sample size = 137, some cases involving more than one domain

More than two thirds of the cases involve either sharing of a **production facility** (36%) or of a **capability** (33%). This dominance is striking. On the more tangible end of the sharing spectrum, a significant amount of practices involves production facilities. In some cases though – such as housing – production was understood as re-production. Indeed, housing can hardly be understood as a product to be consumed: it is a space, a facility, that serves the reproduction of social life, productive capacities, etc. Thus, often the (re)production facility is a shared space such as land or a building. However, as illustrated with the finance and work cases, facilities are not necessarily as tangible as a production site, they often are organizations. At the other end of the spectrum, 45 cases involve sharing in the **capability** domain, and 27 out of them are filed in the book as policies. And even out of the 16 cases that are ranked as initiatives, a good third of them have many qualities of a policy: e.g. the description of Bologna's law on the Care and Regeneration of the Urban Commons (Shareable 2018, p. 252), the Club of Gdansk – a Cross-Sector Collaboration for Urban Administration and Planning (Shareable 2018, p. 260), Pittsburgh's Community Bill of Rights Banning Fracking (Shareable 2018, p. 186), Water Management Beyond Politics in the Netherlands (Shareable 2018, p. 190)… For many policies, it was difficult to identify a sharing practice involving a tangible domain. Conversely, it was difficult not to consider that these policies often contributed to something more intangible: the equal capabilities of citizens to achieve a potential towards social justice (McLaren and Agyeman 2015, p. 205).

I**n Water** cases, Capability is the main sharing domain (9). They depict initiatives and policies that empower communities to govern their water resources more directly and sustainably, whether it is through traditional institutions such as in the Netherlands (Shareable 2018, p. 190) or in Pittsburgh where the municipality banned fracking (Shareable 2018, p. 186), or, for many cases located in the Global South, by building the capabilities of communities to self-govern the resource as shown by the NGO Tarun Bharat Sangh in Rajahstan, India (Shareable 2018, p. 192). Similarly **Governance** stories report on tools and policies that empower communities to make decisions for themselves with online platforms such as the open-source app Loomio (Shareable 2018, p. 258) used for collective decision-making by an artist collective, or the collaborative mapping of SynAthina launched by the municipality to network civic actors in Athens (Shareable 2018, p. 254). Offline, neighborhood assemblies, for example, have also shown themselves as capable of integrating citizens in budgeting processes as in Porto Alegre, Brazil (Shareable 2018, p. 262), or in city planning as in New Orleans after hurricane Katrina (Shareable 2018, p. 259).

In the **Mobility** sector what is shared is mostly a service (9). From private initiatives like Ride Austin (Shareable 2018, p. 70) that offer traditional ride-hailing, to municipal bike-sharing (Shareable 2018, p. 76) or car-sharing (Shareable 2018, p. 77) or even comprehensive shared mobility strategies such as in Milan (Shareable 2018, p. 78) , common sharing services are offered, and sometimes bundled, often in a non-commercial way. The most dissonant case – and therefore radically innovative – is probably one that addresses mobility from the experience side with the Walking School Buses (Shareable 2018, p. 66), showing that a sharing city may emerge solely from activated communities with zero infrastructure or tangible capital involved.

Food cases mostly involve sharing a product (8). Thus, in Dublin, FoodCloud matches stores with surplus food with actors like food banks that redistribute it to people in need (Shareable 2018, p. 82). The Seva Café in Ahmedabad successfully serves meals for free encouraging customers to pay for the next client (Shareable 2018, p. 84). Sometimes, the product shared is not food but cooking tools

as with Kitchen Share (Shareable 2018, p. 90) or seeds (Shareable 2018, p. 93). In some cases (2), mostly with policies, the focus is on sharing production facilities. San Francisco's Urban Agriculture Incentive Zone enables citizens to get a tax reduction for growing food in their gardens in exchange for opening the production sites to the public (classes, customers, community gardeners) (Shareable 2018, p. 92). The small French municipality of Los-en-Gohelle offered free access to public land to farmers on the condition that they grow organic food supplying the schools (Shareable 2018, p. 96). Two policies are remarkable as they support an intangible commons – a capability. Firstly, food sovereignty with nationwide agro-ecological strategy in the Cuba Agro-ecological Strategy to Increase Food Sovereignty (Shareable 2018, p. 94), and secondly, local food security with urban family gardens for low-income households in Medellin, Colombia (Shareable 2018, p. 100).

The sectors of **Land (9)**, **Finance (11),** and **Work (10)** involve mostly sharing production facilities. **Land** cases often involved the re-appropriation of public assets by citizens to turn them into community managed space such as vacant land in New York with 596 Acres (Shareable 2018, p. 148), or in Moldova with the Chisinau Civic Center (Shareable 2018, p. 154), or with Hamburg's Gängeviertel, where citizens reclaimed a historical yet depreciated neighborhood for art and culture purposes (Shareable 2018, p. 153). Community Land Trusts in the UK (Shareable 2018, p. 146) or in the US (Shareable 2018, p. 156) enable low-income households to access property while keeping land itself outside of the real estate market to avoid speculation. What is shared may also be less tangible, such as in the City Repair case in Portland, Oregon, where inhabitants increased their shared capability over their neighborhood by collectively mobilizing and taking unilateral action to make a dangerous intersection safer and spreading the method over the city (Shareable 2018, p. 160). In the **finance** sector, most cases involved a shared production facility that takes various forms: a credit union for underserved communities in Durham, North Carolina (Shareable 2018, p. 237), a cooperative investment fund for local sustainable food production in Freiburg, Germany (Shareable 2018, p. 234), a time bank for the elderly in Japan with the Nippon Active Life Club (Shareable 2018, p. 236), and community currencies such as Conjunto Palmeira in Brazil (Shareable 2018, p. 232), in Brixton in the UK (Shareable 2018, p. 242), or in Switzerland (Shareable 2018, p. 238). In the **work** realm, such facilities are often physical spaces: for digital fabrication with Fab Labs (Shareable 2018, p. 106) or making in a public library in Melbourne (Shareable 2018, p. 111). Shared facilities may take the form of a network of social entrepreneurs such as Enspiral (Shareable 2018, p. 104), or an online platform owned as a cooperative (Shareable 2018, p. 112). But, in many work-related cases (7) the sharing practice may also encompass building up capability. Thus, the One-stop-shop of Social Clauses in Rennes, France, is a municipal procurement contractual practice that requires social inclusion among its suppliers, thereby strengthening the capability of workers with low skill levels (Shareable 2018, p. 120).

A handful of other sectors (energy, waste, technology) gather cases deploying a variety of sharing domains. The **energy** sector displays a combination of cases sharing a production facility (7) such as production cooperatives (Shareable 2018, p. 132 and p. 128), or sometimes a material (2) such as bundled energy purchases (Shareable 2018, p. 130), and capability (3) with feed-in tariffs encouraging renewable energy production, or an oversight public trust ensuring profit sharing among all stakeholders (Shareable 2018, p. 134). Strikingly enough, the **waste** chapter features only two cases where sharing involves the material, waste: the Compost Pedallers in Austin, Texas collect food waste with cargo-bikes to transform it into a valuable product – compost (Shareable 2018, p. 166); and in Curitiba, the municipality gives out food or bus tickets for collected and separated waste (Shareable 2018, p. 168). Others build capabilities (like the Repair Cafés) by helping people to repair their broken devices (Shareable 2018, p. 170) or by supporting communities in self-organizing waste reduction and recycling, as in Johannesburg (Shareable 2018, p. 176). A product might also be shared: a party-pack with reusable dishes to reduce event waste in Palo Alto (Shareable 2018, p. 181), or an open-source tool to monitor waste production and benchmark solutions in Finnish municipalities (Shareable 2018, p. 180). Interestingly, it is in the **Technology** chapter that most practices where it is a material that is being shared can be found, and this material is data:

crowdsourced (Shareable 2018, p. 213), reclaimed from social media (Shareable 2018, p. 212), released as open data through municipal repositories (Shareable 2018, p. 220), or licensed as Creative Commons on municipal websites (Shareable 2018, p. 221). In this chapter, four of the cases depict the sharing of a service, which, for two of them, is the alternative provision of internet access (Shareable 2018, p. 208 and p. 216).

Eventually, in the **housing** sector, in seven cases it is a *re*-production facility that is shared. Indeed, in collectively owning a house in Paris, as with the Babayagas, a self-managed co-housing for seniors (Shareable 2018, p. 48) or the Mietshäuser Syndikat that enables co-housing across Germany (Shareable 2018, p. 44), a very tangible asset is shared – a building – that is central in the social *re*production of productive capacities but most essentially of life in its broadest sense. Alternatively, housing may be provided as a shared experience as at Humanitas where students mingle with seniors (Shareable 2018, p. 40), or at Opportunity Village Eugene where homeless citizens can benefit from one of 30 transitional microhouses (Shareable 2018, p. 42).

As noted in the introduction of this article, a central thesis of the Sharing Cities narrative is to understand sharing in its transformative dimension, beyond its usual framing as transaction (McLaren and Agyeman 2015). For McLaren and Agyeman (2015), the shift in power and social relations as well as an increase in value for all residents is what constitute the transformational nature of sharing. For Neal Gorenflo from Shareable it lies in "solutions that build residents' ability to work together" (Shareable 2018, p. 33). In this regard, with two thirds of cases that either involve the sharing of production facilities or capabilities – rather than just products or services – and most cases displaying some commons elements, this transformational quality is, at least partly substantiated.

4.4. The arenas of impact

Arenas	Count	% (n=137)
1. "Forms of production, exchange and consumption"	103	75%
1. "Institutional, legal and governmental arrangements"	89	65%
2. "The conduct of daily life that underpins social reproduction"	78	57%
3. "Mental conceptions of the world, embracing cultural understandings and beliefs"	69	50%
4. "Social relations between people"	53	39%
5. "Relations to nature"	52	38%
6. "Labor processes"	36	26%

Table 2: Harvey's arenas of potential impact – sample size = 137. many cases impact more than one arena.

Table 2 shows the distribution of arenas of production and social reproduction that are impacted by the case. Almost systematically, cases were estimated as having a potential impact on several arenas simultaneously. While the review attempted to restrict the analysis to the most direct and evident impacts, it is arguable for many cases that they have an impact on many of those arenas at the same time, if not all, as in the case of the Urban Agriculture Incentive Zone in San Francisco (Shareable 2018, p. 92). This regulation provides fiscal incentives for citizens to use their land for agricultural purposes. It is a legal arrangement that intends to affect the structure and location of food production. Doing it may very well affect the cultural understanding of what a garden is, shifting from an aesthetic yet unproductive space to a source of sustenance. The conduct of participants' daily life is affected, possibly blurring the frontier between recreational and productive times. Producing food in a garden arguably transforms people's relation to nature, bringing attention to the environment as a living system, even more so that the plan in question also limits the use of pesticides and fertilizers. Allowing people to use their garden for professional agriculture is also a breach in the traditional urban zoning that separates activities, possibly impacting labor processes by facilitating

hybrid professional activities by reducing the barrier of capital (cultivable land) to enter a new occupation. Eventually, the Bill in San Francisco requires participants to open the land to the public, and therefore will very likely affect social relations between people.

It can legitimately be argued that further operationalization in checking which arenas are affected would provide a more rigorous review and potentially more clear-cut results. Nevertheless, this exploratory review clearly shows that sharing approaches tend to be transversal, not limited to one arena of production and reproduction, and that no arena is left untouched. Noticeably, many of the cases potentially have an impact on institutional, legal and governmental arrangements beyond the cases that are policy descriptions. It is also worth mentioning that labor processes seem to be the least affected (only in 26% of the cases) by the sharing practices and policies described; an observation that is somehow consistent with the fact that very few cases operate on a commercial basis. This observation is an important limit to the transformative reach of sharing, labor processes being at the center of monetary economic activity. And, with only 38% of the cases addressing relations to nature, the Sharing Cities approach seems not to place a systematic focus on ecological sustainability in frontal contradiction with premises as defined by McLaren and Agyemann (2015).

4.5. Is there a commons, really?

There are 35 cases (26%) where a commons could be clearly identified. Present in seven case studies, the land chapter is the one displaying the most examples that are "purely commons-oriented". Whether it is a nature sanctuary recovered from degradation by its neighbors in Cape Town, South Africa (Shareable 2018, p. 152), or housing land owned by a Community Land Trust in London (Shareable 2018, p. 146) and Burlington, Vermont (Shareable 2018, p. 156), or the design of an intersection made safer by its inhabitants in Portland, Oregon (Shareable 2018, p. 160), a community of urban dwellers has direct and collective agency on a specific urban resource that plays an important role in the their daily lives. The physicality of land may play a role in facilitating the re-appropriation of resources. Although, in the mobility chapter, the only one case that really qualifies as commons-oriented is intangible: the commons is a "walking school bus" organized by parents themselves (Shareable 2018, p. 66). The second chapter, by its count of pure commons cases, is the technology one. There, new resources have usually been created by a community: an infrastructure supporting the world's largest mesh network in Germany (Shareable 2018, p. 208), crowdsourced environmental data supported by an open-source sensor, the Smart Citizen Toolkit (Shareable 2018, p. 213), a community coding commons with the Bloomington Coding School in Indiana (Shareable 2018, p. 206). Three cases also depict how communities have created a finance commons through a local currency supporting their local economy (Shareable 2018, p. 238, p. 242 & p. 232). In all these cases, very few (4) depict a long-standing (i.e. over two decades) commons: one of these is Begum Bazaar, a high-street where merchants have probably been self-regulating for centuries and, lately, endured the extreme and pro-car urbanization of Hyderabad, India (Shareable 2018, p. 162). Expectedly, most such "pure commons" are depicted in the book as initiatives and not policies. Though, very seldom, some cases ranked as policies are actually community-run and completely qualify as a commons-oriented initiative: the particularity is that they are recognized and supported by the local government. This is the case of the Brixton Pound, a local currency scheme started at grassroots level, which now has its own mobile electronic payment system and is recognized for paying local taxes (Shareable 2018, p. 242). In Paraguay, community-based sanitation boards that are fully endorsed by the state, enable residents to self-manage water and sanitation services directly (Shareable 2018, p. 196).

63 cases (46%) contain some commons elements. Many of these have strong commons features, the strong role played by market mechanisms or state institutions exclude qualifying them of pure commons. On the one hand, cases describing a cooperative are generally classified here, as they are largely market actors even though they have many qualities of a commons. One good example is the Community Solar Gardens in the State of Minnesota, where the State facilitates the process of acquiring shares in a solar energy cooperative for people who do not own themselves assets where

solar production capacity could be installed (Shareable 2018, p. 140) : there is a shared ownership of a resource but through a cooperative, a market mechanism. On the other hand, in cases such as municipal open-source software in Munich (Shareable 2018, p. 218) and Grenoble (Shareable 2018, p. 222), open data in Montevideo (Shareable 2018, p. 220) and Rotterdam (Shareable 2018, p. 159), in spite of the existence of a clearly defined shared resource, the fact that the local government is the main actor governing and maintaining the resource was thought to exclude them from "purely commons-oriented" cases. In plenty of other cases, the existence of a third-party provider is often justifying why an initiative is thought of as having only "elements of a commons". Thus, the CoAbode platform matches single mothers who look for a flat share to facilitate mutual support (Shareable 2018, p. 46). The flat share that results from the matching is a commoning practice. However, the case focuses less on co-housing space than on the online platform, the management of which is taken care of by a non-profit, not the users themselves. Examples of such intermediation abound: in Kigali, Rwanda, SafeMotos has built and manages an online platform to rate motorbike taxi drivers with the aim of strengthening the commons of safety in that specific business; Embassy Network offers flat shares for purpose-driven young professionals around the world (Shareable 2018, p. 49); Opportunity Village Eugene provides transitional housing for homeless people (Shareable 2018, p. 42).

39 cases (28%) describe an initiative or policy that set favorable conditions for the emergence of commons-oriented approaches/practices. Policies that directly support the emergence of commons-oriented models, such as cooperatives in New York with the Worker Cooperative Business Development Initiative (Shareable 2018, p. 115), or all-encompassing policies such as in Seoul (Shareable 2018, p. 114), Barcelona (Shareable 2018, p. 116), or Bologna (Shareable 2018, p. 252), which promote unambiguously and specifically sharing and commoning practices in many sectors and dimensions. These may also be policies that do not conceptualize a commons, but are putting in place a framework that *may* be favorable to commons-oriented practices and organizations such as in the UK with the Public Services (Social Value) Act 2012 (Shareable 2018, p. 118), various participatory local policy practices (Shareable 2018, p. 266 & p. 52), or, as mentioned by Gorenflo in the book's introduction (Shareable 2018, p. 29), policies that may create the conditions of a commoning practice by re-localizing the (re)production of a resource like food (Shareable 2018, p. 94), (Shareable 2018, p. 92), energy (Shareable 2018, p. 139 & p. 136), or, in the case of water, the re-localization of resource ownership through privatization reversal as in Paris (Shareable 2018, p. 202) and Bolivia (Shareable 2018, p. 198). In the finance sector, credit unions (Shareable 2018, p. 237) or banking services with a community- or public-purpose (Shareable 2018, p. 247 & p. 240) may provide favorable conditions towards strengthening the intangible commons of accessible financial services.

Results have shown that 70% of cases do include at least some commons element, and 26% with clearly-identified commons. Still, the book is a clear contribution to address what Gorenflo in the introduction called people's blindness to the commons option (Shareable 2018, p. 27). With a vast majority of communal cases, it is also a unique, substantial, and empirical contribution to McLaren and Agyeman's argument that the sharing paradigm is not only an economic activity, but also a political and cultural one (McLaren and Agyeman 2015, p. 9). By displaying communal solution-oriented cases in sectoral chapters such as water, energy, food, work, or housing, Shareable strongly echoes the idea that instead of automatically turning to markets or states to solve "problems", we could look at our primary needs in cities and "the whole range of ways in which we can enhance human well-being in just and sustainable ways" (McLaren and Agyeman 2015, p. 9).

5. Discussion

This section discusses three key issues of the Sharing Cities narrative in light of the existing literature: the role of digital platforms; the transformative nature of sharing; and the epistemological foundations of commoning as encompassing paradigm.

5.1. The role of digital platforms in sharing

The initial framing of Sharing Cities at the intersection of the cyber space and urban space (McLaren, Agyeman 2015, p. 1) tends to suggest that digital technologies would play a central role. However, our results show that only a third of the cases assembled by Shareable are digitally-based, further making the case that the sharing is not limited to digital platforms (Boyko et al. 2017). This also situates the Sharing Cities discourse out of reach of the technological solutionism critique articulated by Morozov (2013) or Kitchin (2014). Furthermore, cases where digital technology was involved have often featured open source software stacks, giving ownership and agency back to communities. This encourages bridges with scholarship that conceptualized an the role of open source technology to play a key role in sustainable development: see open source appropriate technology (Pearce 2012) and cosmo-localization (Ramos 2017).

Within the sharing movement, the question of the ownership of digital technology has led observers to describe the sharing economy as a "neoliberal nightmare" (Martin 2016) or "neoliberalism on steroids" (Murillo et al. 2017). In response, the search for alternative models is mostly discussed around the Platform Cooperativism concept, putting the question of platform (cooperative) ownership at the center (Shareable 2018, p. 112; Scholz 2016). Co-opted by large capital, sharing platforms are said to have aligned to mainstream economic imperatives (growth, consumerism, profit maximization) obliterating their initial promise for equity and sustainability (Murillo et al. 2017). Responding to the fact that cities are on the frontline in dealing with the disruption of the sharing economy, Schneider (2015) and Scholz (2016) argue that platform cooperatives could show as particularly relevant for municipalities: these and their communities could globally pool resources to create shared software platforms and locally manage sharing businesses such as short-term rentals to keep the value generated in local hands.

However, these community-owned platform cooperatives are mostly in the project stage and still need to prove they are actually working beyond isolated experimental ventures. Platform Cooperativism has also been exposed to two further lines of criticism. On the one hand, proponents of Open Cooperativism (Conaty and Bollier 2015; Pazaitis et al. 2017b) insist on maintaining technical infrastructure as an open commons as a safeguard, arguing that the cooperative model has not prevented many organizations from mimicking global corporations in their market behaviors, organizational cultures, and management styles. On the other hand, platform cooperatives are still a third party, an intermediary organization. In contrast, the emergence of the blockchain technology opens up the possibility for commons-based peer production to emancipate from platform third parties (Pazaitis et al. 2017a). Thus, for many observers of the sharing economy, the distributed blockchain technology and the Internet of Things will enable the disruption of big centralized platforms and truly unleash the potential of peer-to-peer economic transactions (Huckle et al. 2016; Rustrum 2018; Vilner 2018). Nevertheless, critics have stressed that traditional issues of power and collective ownership cannot be "programmed away" (P2P Foundation 2016). This tends to be confirmed by the recent story of Arcade City, the foremost example of a city-oriented blockchain application that had positioned itself as a distributed alternative to Uber and was faced with major issues of ownership which derailed the initiative (Hussey 2019). In this light, the editor's decision to leave out blockchain and the Internet of Things from Shareable' book, and instead favor approaches like Platform or Open Cooperativism, focused on sharing ownership rather technological innovation, seems savvy and should inspire further research.

This is particularly important when the performative nature of discursive resources that describes new experiments is taken into account (Gibson-Graham 2008). Not ceding to the sirens of technological solutionism on a sharing scene saturated with tech hype appears as a "discourse of economic difference" as put by Gibson-Graham (2008) or Healy (2009) in conceptualizing the search for alternative or diverse economies. Thus, while a certain number of scholars are busy developing an enlightening critique of the smart cities discourse (Grossi and Pianezzi 2017; Kummitha and Crutzen 2017; Cugurullo 2017; Kitchin 2014; Townsend 2014) or rethinking it (Morozov and Bria 2018), the endeavor to put forward a truly alternative narrative of how digital collaboration may contribute to just and sustainable cities – e.g. Sharing Cities – could take inspiration from the rather low-tech

approach found in Shareable's (2018) effort and alternative models such as Platform or Open Cooperativism.

5.2. The transformative potential of Sharing Cities

McLaren and Agyeman (2015) and Shareable's (2018) understanding of the transformative nature of sharing lies on shifting power relations in favor of communities. However, existing literature addressing the transformational nature of social innovation has also stressed the criteria of *translocality* as determinant (Ruijsink et al. 2017). Thus, Transformative Social Innovation (TSI) is defined as "a social innovation process that challenges, alters, or replaces existing institutions and institutional arrangements *across* the context (i.e. in more than just a single isolated social experiment)" (Haxeltine et al. 2016, p. 11). Some of the cases such as Repair Cafés, FabLab, or Walking School Buses that are presented as translocal cases (Shareable 2018) ought to be qualified as TSIs. But, many other cases – approximately half – have locally co-evolved. In contrast to the sharing economy and the global up-scaling of its platforms powered by billions of dollars in capital, various authors have noted that social innovations are rather prone to be *replicated* (Hansen and Coenen 2015) or *scaled out* (Manzini 2015), multiplying and adapting the same ideas and process across locations, enabling them to stay true to their original values (Seyfang and Longhurst 2015). Analyzing the Sharing Cities movement, Sharp (2018) observed that Shareable has catalyzed grassroots actors in replicating successful experiments. Niche resources and intermediary organizations are indeed known to play an important role in the diffusion of grassroots innovations (Smith et al. 2013; Seyfang and Longhurst 2015). In this context, *Sharing Cities* (Shareable 2018), with its cookbook style, clearly adds to niche resources known to play an important role in the diffusion of grassroots. It also offers a generative and practice-oriented narrative of change (Haxeltine et al. 2016), and as a discourse of economic difference it can be interpreted as a performative ontological intervention (Gibson-Graham 2008).

Bringing the narrative to an institutional level, McLaren and Agyeman were also suggesting to "share the whole city" (McLaren and Agyeman 2015, p. 5) by referring in particular to Seoul's far-reaching pro-sharing policy. Similarly, Foster and Iaione (2015), building upon their catalyzing work with the city of Bologna (2014) and its *Regulation between Citizens and the City for the Care and Regeneration of Urban Commons*, have argued for thinking of the city itself as a commons: an institution for collective action. These two instances of a city that is scaling commoning to a strategic level are duly reported in Sharing Cities (2018). Only one other such case is made mention of: the Barcelona ProCommuns policy, initiated by the municipalist coalition Barcelona en Comú led by housing activist Ada Colau. Yet, in these accounts little attention is given as to how to build the local political leadership required for raising commoning to such a level on the city agenda. Those three cases displayed a singular political dynamic: in Seoul, the mayor was a long-standing civic rights advocate; in Bologna, the whole region of Emilia-Romagna is known for a long tradition of public support of the cooperative sector (Restakis 2007); and, in Barcelona, as Rubio-Peyo (2017) reports in an analysis of municipalism in Spain, the local Council was elected as part of a country-wide movement of "political confluences" bringing together the commons approach and Bookchin's libertarian municipalism (1991). Thus, referring to such cases the Sharing Cities discourse positions itself beyond the "post-political trap" of economic or technological determinism (McLaren and Agyeman 2015; Kitchin 2014), but somehow fails to provide a reproducible approach. For Bauwens and Niaros (2017) who have identified similar commons-oriented political coalitions in the cities of Frome, Milan, and Ghent, the horizontal and translocal dynamic of bottom-up commoning initiatives needs to be completed by a vertical political dynamic that remains participative (Bauwens and Niaros 2017). On this somewhat blindspot, the urban commons literature could learn from the transition management literature applied to urban contexts that has explored ways to facilitate the local upscaling of transitions initiatives (Roorda et al. 2014).

5.3. Towards commoning as a more-than-human politics for Sharing Cities

With 70% of cases that include at least some commons element, Shareable's (2018) effort is a clear step towards dissipating "people's blindness to the commons". By transforming our understanding of how resources are shared and produced by communities (Ostrom 1990), the commons paradigm is emerging as a foundation of the sharing transformation for just and sustainable cities, adding to a growing body of work (Radywyl and Biggs 2013; Foster and Iaione 2015; Chatterton 2016; Bauwens and Niaros 2017; Labaeye and Mieg 2018). However, as results showed, labor processes and relationships to nature were the two categories least impacted in *Sharing Cities* (Shareable 2018) cases. In other words the two categories that have been at the core of much progressive socio-political movements of the second half of the 20th century would be the least concerned by the Sharing Cities narrative, a major blow to its promoters whose ambition is to promote "just and sustainable cities" (McLaren and Agyeman 2015).

This contradiction needs to be discussed. Of course, on a methodological level, one can argue that Shareable's account missed out on specific practices: thus, coworking is overlooked while it has become mainstream and has been described as a new urban infrastructure enabling community-based collaboration and social relationships for otherwise isolated workers (Merkel 2015). Likewise, the present review of cases may have been too conservative – which is difficult to estimate, given the low operationalization of arenas of impacts.

More certainly though, this contradiction may have epistemological reasons. Indeed, categories such as work/labor or nature may well have been too narrowly conceived: as an illustration, the chapter dedicated to work in *Sharing Cities'* (2018) does not include any example of care labor or domestic activities. A feminist perspective on work and the economy, however, has demonstrated that reproduction of work and social life is made possible only through unpaid domestic work and other practices of care that are generally not seen as labor (Federici 2004; Mies 2014). As for nature, ecofeminists point out that, rooted in classical and dualist ontologies, classical economic epistemologies systematically ignore the contributions of non-humans and see in the duality of nature/culture, a main cause for human (over) exploitation of the non-human (Mies and Shiva 1993). In contrast, understood in the context of a relational epistemology (Linebaugh 2008; Bollier and Helfrich 2015), commoning is a more-than-human phenomenon (Bresnihan 2016) and invites us to reconsider the basic tenets of analysis beyond the classical object/subject, natural/human divide, or even Marxist categories:

> *"The agent of change, the commoner, is no longer (and perhaps never was) a person or a category such as the working class but an assemblage. Certainly these assemblages include humans, but they also include non-humans; they may include class but also non-class alignments; they may include social movements and grassroots organisations but also governments, institutions and firms; they may include non-market mechanisms but also markets; they may include animate beings who have nothing in common except breathing and living, but also inanimate entities that share an existence on this planet." (Gibson-Graham et al. 2016, p. 210)*

This resonates with a more general call for sustainability science to adapt to the reality of the Anthropocene where the natural cannot be distinguished anymore from human influence (Decuypere et al. 2019; Arias-Maldonado 2016). With this relational framing, identifying commoning shifts the focus from a shared resource, its associated practices and impacts thought of as separate units of analysis, to a commoning-community where the commons itself is the measure of success (Gibson-Graham et al. 2016). To illustrate this alternative epistemological viewpoint, it is useful to look briefly at three cases from *Sharing Cities* (2018) in a new light.

- Foodcloud in Ireland is a simple app that allows the redistribution of surplus food to people in need (Shareable 2018, p. 82). In this article, the case was reviewed and ranked as not affecting relations to nature: food being understood as a human commodity. In contrast, a more-than-human commoning perspective makes obvious that plants play a key role in the availability of (surplus) food for people in need. It is the partnership of a commoning-community formed by people in need, local businesses, activists, plants produce, a digital app

system, and a supportive legal environment that allow a commons of consumable and affordable surplus food to emerge with a strong local sustainability impact: indeed, since its inception, Foodcloud distributed 20 million meals and diverted 9000 tons of waste from landfill (Shareable 2018, p. 82).

- The Urban Agriculture Incentive Zone in San Francisco (Shareable 2018, p. 92) shows how one sharing initiative may transform at the same time many established – and interdependent – dimensions of life in the city by facilitating the coexistence of functions that are usually considered as separate in the Global North: leisure versus labor, productive vs reproductive time and space, residential vs agriculture, private garden vs public space, city vs nature, etc. Here, by accepting that commoning is not to be reduced to questions of resource and property (Gibson-Graham et al. 2016), we are able to identify a new commoning-community where naturalist epistemologies could not identify a clear-cut commons.
- In New-Zealand, the national parliament granted full rights of personhood to the Whanganui River, answering a long-standing revindication of the Whanganui iwi people. This opens far-reaching possibilities for the latter: to ensure the protection of the river it derives its very name from (Shareable 2018, p. 201). This restores an indigenous cosmology that conceives the identity of the human community as intertwined with the non-human (the river). This example embodies the assertion that commoning is a relational process of negotiating access, use, benefit, care and responsibility; between humans, and between humans and the non-human world around them (Gibson-Graham et al. 2013; Weber 2015). Importantly, from this relational worldview the commons are not seen as objects that pre-exist their creation, but rather as generated by social relations and practice (Huron 2015; Walsh 2018).

When seen through the lens of commoning as a relational and more-than-human reality (Bresnihan 2016) the cases stated above illustrate the (re)emergence of a relational worldview "in which people, business, economy, environment and society are no longer separate worlds that meet tangentially, but are deeply interconnected and mutually interdependent" (Giorgino and Walsh 2018a, xii). The latter argue that a worldview transition requires what Scharmer and Kaufer (2013) called a shift from ego- to eco-consciousness (Giorgino and Walsh 2018b). To facilitate such a transition, contemplative and mindfulness practices are seen to play a catalyzing role (Scharmer and Kaufer 2013; Giorgino and Walsh 2018b). Interestingly, Doran (2017) argued that a surge of mindfulness practices can be observed in society and may contribute to the creation of spaces for commoning. These deserve attention for their potential contribution *as* and *to* commoning practices that bring about just and sustainable Sharing Cities; an orientation that would bridge this urban narrative with exciting recent work, stressing the potential contribution of mindfulness practices to sustainable development in relation to education (Böhme et al. 2018), organizations (Manuti and Giancaspro 2019) or behavior (Barrett et al. 2016; Ericson et al. 2014).

6. Conclusions

Using McLaren and Agyemann's Sharing Cities approach, the case review showed that most practices depicted by Shareable (2018) as constituents of Sharing Cities are communal, although the degree of communality varies, with many cases involving monetary exchange, for example. Results also showed that sharing involves equally tangible and intangible domains with two concentrations on (re)production facilities and capabilities, confirming the transformative focus of the Sharing Cities rather than transaction-centered discourse characteristic of the Sharing Economy. The scaling of commoning practices is seen as happening through horizontal dynamics of replication and out-scaling, but also requiring political leadership at the level of cities. In this regard, resources depicting concrete and replicable commoning practices are seen as playing a key role in performing sharing cities.

Notably, digital platforms were found not to be central in the Sharing Cities narrative - a clear contrast to the zeitgeist of the sharing economy and smart city discourse. To this end, the alternative

sub-narrative of Platform/Open Cooperativism displace the discussion from a rampant technological solutionism to elaborating new and cooperative – commoning – models, to ensure the collective ownership of digital platforms.

While most cases reviewed do display some commons elements, only less than a third depict a clear-cut commons as understood by the Ostrom tradition and its rather naturalist epistemology. However, a more-than-human and relational understanding of (urban) commoning focuses on commoning-communities rather than resource, and may prove more useful in understanding the nature of the sharing transformation, at the intersection of the cyber and urban spaces that are characterized by complexity. But more importantly, it is an epistemological response to the emergence of a new worldview based on interdependence, deemed necessary to answer the challenges of the Anthropocene that shatters classical, dualist, naturalist, predatory ontologies to their core (Ruder and Sanniti 2019). By bringing focus to the alternative political economy of commoning at the intersection of the digital and urban spaces, the Sharing Cities narrative offers avenues for not only articulating a set of policy proposals and practices, but translating an alternative and emerging worldview based on interdependence, reciprocity, and cooperation (Klein 2014) into the urban context.

Concretely, in a context where traditional approaches to sustainability show their limits in the face of the everyday reality of the Anthropocene, research on ways to foster sustainability in and from cities needs to shift gear towards more radical epistemological approaches. This can take the shape of a research agenda that is informed by a relational epistemology, which seeks to identify commoning-communities in urban contexts, building upon the Diverse Economies research program achievements (Roelvink et al. 2015). As an illustration of the widening of scope needed, it may be useful to document – as component of the Sharing Cities narrative – the contribution of contemplation and mindfulness practices to birthing a more-than-human worldview, possibly depicting urban commoning-communities that cater to contemplative commons (Doran 2017).

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